THE IRON TRADE REVIEW

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CLEVELAND, O., JUNE 13, 1889.

THE WEEK IN IRON CIRCLES.

General Features.

Singularly, the recent disaster to the Cambria Iron Company is made the basis of demand for insisting upon the acceptance of the new scale of the Amalgamated Association of Iron and Steel Workers. It is argued that the destruction of buildings and bridges in the Conemaugh Valley will cause a brisk demand for construction iron and steel, and that the mills can well afford to pay the scale. Whether the manufacturers will be able to see it in that way remains to be demonstrated. The dissolution of the Manufacturers' Association is held by some to be a decided *coup d'etat*, but the Amalgamated Association, thus debarred from treating with the employers in a representative capacity, will nevertheless present the scale to the different mills direct. It is understood that the unfilled orders of the Cambria Works for steel and rails will go to the Edgar Thomson Works. Coke production has been materially reduced and prices hang about the one-dollar figure. Increased activity is noticeable in the Cincinnati iron market, but without any improvement in prices. In fact, some sales have been made during the week lower than anything yet reported. Very considerable blocks of Southern iron have been placed, partly for early deliveries, and partly for deliveries running through the year, the latter generally at prices 25 cents above figures for Summer deliveries. Production is slowly diminishing, but if there is no improvement soon, the blowing out process will be rapid and extensive, as many plants now running are netting a loss for every ton of iron sold. At Detroit the condition of the market remains about the same as it has been for the past two or three weeks. Furnace-men in that section feel confident that an advance will take place in the near future and are holding very firm at present prices, and some refuse to contract for delivery extending beyond August. Inquiries for larger amounts of Lake Superior charcoal iron have been received in the last few days than for some time past, and this, with the present restricted production, our correspondents think, will very soon have its effect upon the market. Our advices from Chicago are that buying of pig iron is going on with considerable freedom. Some consumers are providing for their wants as far ahead as furnaces will agree to deliver on current prices. The Chicago and Milwaukee furnaces are competing sharply for local and Northwestern business in strong coke irons, and prices have been forced so low that even the lowest grades of Southern coke irons cannot get in, unless needed for mixture. Lake Superior Charcoal iron is more active, but no improvement in prices is heard of. Although there are numerous inquiries, comparatively few sales of any size are reported at St. Louis. It is stated that other markets have taken nearly all the Southern grey forge, mottled and soft irons, and the furnaces are feeling rather stiffer about prices. Some have made figures that practically withdraw them from the market, feeling sure of an advance later. Reports of a somewhat more encouraging nature come from the Southern markets at Louisville. There have been some large orders placed during the past week, one for 3,000 tons. Heavy buying has also taken place in the surrounding territory. Prices, however, have not advanced, and 2,000 tons of grey forge were offered at Louisville, last Friday, at $12 cash, showing no improvement. The heavy purchases should lead to a slight advance, but so far this has not been the case. Opinions vary in regard to any immediate improvement. One of the largest buyers in Louisville feels that, in November, iron will be as low as it is to-day, and that to purchase for any great length of time, would simply be to lose the interest on the investment.

Iron Ore.

The principal events of the week consist in the suspension of active mining operations of the Iron King, and of the sale to the Metropolitan Iron and Land Company, of the Pabst mine. With the shutting down of the Iron King, the last chapter is recorded of what a few years ago was considered to be one of the largest mining combinations ever in the field, and which was known as the Bessemer Consolidated, controlled by Mr. Burton. A great many people put their money into the stock, and nearly all of it was swept away. The one remaining mine, the only one in fact that produced ore, was the Iron King, carrying a high grade of Bessemer hematite. Time, however, demonstrated the fact that even a possible production of one hundred thousand tons of ore was insufficient to face a burden of seven and one-half millions of stock and eight hundred and fifty thousand dollars of bonds, and as there was no capital for carrying on mining operations beyond that obtained from sales—a hand-to-mouth process at best—things came to a turn where to close down was a necessity. This will probably wind up the Bessemer Consolidated, and will result in the absolute sale of the Iron King to some parties financially able to carry on active operations. The Pabst was purchased by the Milwaukee people above mentioned for $350,000. It is located just north of the Aurora, and its ore, which is a Bessemer, will, it is said, improve as the shaft approaches the Aurora drift. The Metropolitan Iron and Land Company now controls the Norrie, East Norrie and Pabst mines. An attempt was made during the week to boom lake freights, but without success, charters remaining at $1.25 from the head of the lake, $1.25 from Marquette, and 90 cents from Escanaba. The efforts of the Cleveland furnace-men to secure for this market some concession from railways have not yet been successful. The railways, it should be remembered, reduced the carrying charges of ore into the valley as well as the pig iron freights out of the valley, which is a clear discrimination against the Cleveland interests, unless a reduction is made in coke freights bound for this point. A conservative estimate of ore sold thus far, made by three well-posted ore dealers, results in the opinion that the sales at this time approximate fully thirty-seven hundred thousand tons.

Pig Iron.

All reports to the contrary, notwithstanding, the sale of the Union Rolling Mill Co.'s Emma furnace to the Cleveland Rolling Mill Co., or to anybody else, is pure fiction, as is the statement that the recent improvements made to that furnace have been found unsatisfactory. On the contrary, the furnace was blown in again this week and is turning out an average of 140 tons prime pig metal every day. There is little change in the situation, at least, as to prices. Inquiries are more plentiful, however, and there is an active movement on the part of buyers who are anxious to purchase in large quantities for a year's delivery at present prices. All such offers are rejected, which in itself is an indication of a better market. The enormous consumption of pig iron seems to have stimulated the buyers, and the chances are favorable for an advance before a great while.

Merchant Iron.

Quite a good many sales are reported of bar iron at $1.50 at the mill, with ten cents added from store. There is a good demand for beams, the combination price being shaded here and there as occasion seems to warrant. Rail orders are plenty, but the price is very low. The advance announced in Eastern markets has not as yet affected the local trade.

Scrap Iron.

Old American rails are held at $21.50, and several sales are reported at that figure. Car wheels are not wanted at their present price, $18. No. 1 wrought scrap sells for about $18, with No. 2 at $13. Crop ends are worth from $13 to $14, and turnings about $13.

HEROIC TREATMENT FOR THE NAIL TRADE.

"Cold Short" writes the *Ohio Valley Manufacturer* a crisp and meaty letter on the nail situation in the Wheeling district, which is entitled to a wide reading. As everybody knows, the nail business is in sad straits, and the remedy proposed by the writer is not simply novel, it is truly heroic. This is what he says:

I claim that there is not one establishment, or any business in the Wheeling district, whose affairs are as ably and vigilantly managed and fostered, as those of every business that is worth going into should be, that is not in first-class condition, either to meet and participate in prosperity, or to encounter and safely resist the trials of adverse weather. Now, as this may need explanation, I will state exactly what I do and what I do not mean. I do not presume to insinuate that the regular business operations, transactions or processes of any concern are mismanaged or neglected, for that is nobody's business but their own, and I don't know, and do not want to know, anything about such delicate inside subjects; but I do mean, that as individual officers or members of a most important and heretofore prosperous department of business, they have been and are now mismanaging.

They might keep on the line they are now following until 1900 and after, and they will accomplish nothing. Regulate yourselves before you try to regulate each other. Put aside jealousies, quibblings and fighting against the inevitable, come down to the study of practical causes and results and resume the use of the methods and expedients established and insisted upon by the science of legitimate business. As Horace Greeley pertinently remarked, "the only way to resume is to resume," and the only way to remedy the great and notorious trouble that has been brought upon the nail business, viz., overproduction, is to counteract it by destroying the source from whence it proceeds. Don't merely throw the belts off the pulleys and give the nailers and feeders furloughs, but break the machines up and throw them into the scrap piles, and put in machinery that will produce something that has not been overproduced to death, in the places now occupied by them. Don't sell them to somebody else to run them, that would be only shifting loads and responsibilities. Diversify products—and the only way to do this, is to do it; don't waste time in speculations as to what to substitute for nails, or as to which is most likely to be the most profitable diversion to make, but act and act promptly; every day that passes is a day irrevocably lost. Indecision and postponement mean lack of purpose, want of originality and the absence of individuality—and the man that has not a fair tincturing of all these three in his mental composition, had better get out of the way, as the race is not for nondescripts and blunderers.

The spectacle of our Wheeling friends engaged in a general machine-smashing bee would be, indeed, edifying, but we doubt if "Cold Short," or any one else, will ever witness it. There is, however, any amount of good, solid sense in the suggestion, applicable as well to other lines of iron and steel manufacture. It is not unlikely, indeed, that, in some instances at least, a wholesale destruction and remodeling of plants into some lines of manufacture not already overproduced to death, would prove a lasting benefit to both stockholders and communities.

SOME RECENT BOOM LITERATURE.

And now Mobile aspires to be the great steel center of the Republic. In a recent letter to Mr. Andrew Carnegie by a member of the Mobile Chamber of Commerce, some of the points in favor of locating great steel works at that place were enthusiastically set forth. Their substance is herewith given as an interesting chapter in the boom literature of the day: Mobile, it is said, has tributary to it over 2,000 miles of navigable rivers, penetrating the very heart of the coal, iron ore and limestone region of Alabama, and affording extremely cheap transportation for these raw materials. The city also has three railroads. The harbor is pronounced one of the safest on the Gulf, with 23 feet (prospectively) on the inner bar and 24 feet on the outer. With reference to Mexico, Central and South America, the proposed Nicaraugua and Panama canals, the Pacific Coast, and the Western, Northwestern and Southern States, the geographical position of Mobile is held to be the best possible adapted to the distribution of goods. Cuban ores, it is claimed, can be laid down at Mobile, at a cost not to exceed $2.50 to $2.75 per ton, and labor is cheap and abundant. The writer thinks that the establishment of a steel plant at Mobile would influence the Government to establish a large navy yard on the Gulf, and he wants Mr. Carnegie to establish such a plant, and do it right away, quick.

Duluth, on the other hand, modest, retiring and self-deprecatory, lays no claim to tide-water advantages and the like, but, according to the Duluth *Herald*, she is "The American City of Destiny," and she proposes to maintain her copyright on that name at all hazards. After dilating at length upon the natural and artificial advantages of the city as the great *entrepot* for the grain and iron of the Northwest, the *Herald* closes as follows: "The Duluth of to-day is but a mere speck—a pebble upon the shore of Lake Superior—in comparison with the Duluth of the future, the ultimate Duluth which pictures itself to the imagination of those who know and ponder the grand significance of the conditions steadily and inevitably uplifting her. Our most sanguine expectations of to-day are but gropings after a truth the full glory of which we cannot yet comprehend. It is not that we are struggling to build up a city here; we are working to fulfill an edict of nature. Duluth is the American City of Destiny." We had supposed that Duluth's enterprising citizens were working to fill their pockets, rather than to fulfill an edict of nature, but let that pass. Duluth is a very interesting and progressive city, and will be heard from in the future, without a doubt.

THE GREAT BUSINESS OF A GREAT CANAL.

Always an interesting study are the statistics of tonnage of St. Mary's Falls Canal. Those for May, just published, by the Sault Ste. Marie *News*, show such remarkable results that they will bear repetition, albeit the subject is a trifle threadbare. According to the *News*' statement, the total number of vessels which passed through the canal during that month was 1,412, or an average of about 46 a day. The passages are classified as follows: Steamers, 936; sail vessels, 406; rafts and unregistered craft, 76. The total registered tonnage of vessels passing through the canal during May was 1,036,882, and total freight tonnage, or weight of cargoes 907,237 tons. A comparative statement of the canal traffic from the opening of navigation to June 1, during 1888 and 1889, is given below:

	Registered Tonnage.	Freight Tonnage.	Passages.
1889	1,225,369	1,026,858	1,712
1888	480,885	630,659	859
Excess in 1889	744,484	396,200	853

The number of vessel passages, as will be seen, was nearly twice as great in 1889 as in 1888; the gross freight was greater by 63 per cent. than last year, and the gross registered tonnage 115 per cent. greater. While this is largely due to the early opening of navigation, it must be remembered that, by reason of delayed coal shipments, the up-freight tonnage was disproportionately small. Had it kept up to the usual proportions, the showing would have been unprecedented.

RECENTLY our contemporary, *Industry*, of San Francisco, sent a clipping, in regard to the mysterious methods of manufacturing Russia tin, to Major-General Altfate, Director of the Royal Arsenal at St. Petersburg, and received the following interesting reply: "I laughed much about the nonsense recited in the cutting inclosed in your letter of March 20th, regarding our sheet iron, and beg to say that the best sorts of Russian sheet iron exported to foreign countries are manufactured in the Ural region, not by Government works, but by those of private firms, the Lacovleff's works being the most celebrated. Of all the quantity of Russian sheet iron manufactured, not more than ten per cent., and that not of the finest sort, is made by Government works; all the rest, or nearly ninety per cent., is made by private firms. There is no trade secret in the fabrication of Russian sheet iron, the excellent quality being the result of (1) the extremely pure ore; (2) the exclusive employment of charcoal as fuel; and (3) the high workmanship in the installation, arrangement and extendance of all the processes of rolling."

WE notice some surface indications of a movement to "boom" the Vermilion Iron Range. We trust the scheme will die in its inception. The experience of the Gogebic Range in the matter of "wildcatting" should serve as a standing warning against similar operations in other ranges. Thus far the Vermilion district has measurably escaped this evil, but there are always men selfish enough to look at their own immediate interests rather than to the good of the entire district. The newspapers of Minnesota and Wisconsin can do untold harm by farthering these schemes, or they can nip them in the bud by prompt and judicious action. Will they do it?

IN discussing the effect which the recent cut in pig iron by the Thomas Iron Company will have upon the iron markets, North and South, the *Industrial World*, of Chicago, assumes the position that "tniisout o iof eg equiltbrium with what it is ura sN cflteuh. Many tendencies are nhm rn itso continuance. So soon as ⌐oh lNdhteo raistinctly feel the in-aabusirlhneonce of Southern wages upon its own, self-interest will be summoned into the problem, and become an additional factor in its solution." It seems to us that this leaves nothing to be said on the subject.

THAT THE IRON TRADE REVIEW'S interest in the retention of the present tariff on iron ore should be called in question, will occasion a broad smile on the part of those familiar with the position of this paper. More ludicrous, even, is the inference that we "would

not object to have the tariff on foreign ore entirely suspended." Denial is scarcely necessary, yet it may be well to say that THE IRON TRADE REVIEW has never, even by inference, taken a position in the least antagonistic to the present tariff on iron ore. Moreover, it not only advocates the retention of the present duty, but, should the necessity arise for the further protection of our Lake Superior and Southern mining interests, it will support a judicious increase on the duty. We trust this is sufficiently clear even to hasty and ill-informed readers.

THERE appears to be a conspicuous lack of confirmatory evidence of the reported establishment, at Duluth, of a new company to put twelve mammoth steel steamers into the water as fast as they can be built. The boats, as reported, were to be constructed on Lake Erie, and to cost in the neighborhood of $325,000 each. Prominent railroad men, principally of the Pennsylvania system, were quoted as the prime movers in the enterprise, but dense ignorance on the subject was professed at the principal offices of that corporation.

MINERAL PRODUCTS OF THE UNITED STATES.

The sixth report on "The Mineral Resources of the United States," by David T. Day, Chief of the Division of Mining Statistics and Technology, United States Geological Survey, is to be issued shortly. This report is for the calendar year 1888, and contains detailed statistics for this period, and also for preceding years, together with much descriptive and technical matter. The following are the totals of the production of the more important mineral substances in 1888, as kindly furnished THE IRON TRADE REVIEW in advance of official publication:

METALS.

Iron and Steel.—The principal statistics for 1888 were: Domestic iron ore consumed, about 12,060,000 long tons; value at mines, $28,944,000. This is an increase over 1887 in quantity of 760,000 tons, but a decrease in value of $4,956,000. Imported iron ore consumed, 587,470 long tons; total iron ore consumed in 1888, about 12,650,000 long tons, or 150,000 tons more than in 1887. Pig-iron made in 1888, 7,489,738 long tons; value at furnace, $107,000,000. This is an increase over 1887 of 72,590 tons in quantity, but a decrease of $14,925,800 in value. Steel of all kinds produced in 1888, 2,879,440 long tons; value at works, $89,000,000. This is a decrease from 1887 of 439,631 tons in quantity and of $14,811,000 in value. Total spot value of all iron and steel made in 1888, in the first stage of manufacture, excluding all duplications, $145,000,000, a decrease of $26,103,000 as compared with 1887. Limestone used as a flux in the manufacture of pig-iron in 1888, about 5,438,000 long tons; value at quarry, about $2,719,000.

Gold and silver.—According to the Director of the Mint, the gold product was 1,604,927 fine ounces, valued at $33,175,000. This is about the same as in 1887, being an excess of only $75,000. The silver product was 45,783,632 fine ounces, of the commercial value of about $43,000,000 and of the coining value of $59,195,000. This is an increase of 4,515,327 ounces over the product in 1887. In addition to the product of our own mines some 10,000,000 ounces of silver were extracted in the United States from foreign ores and bullion.

Copper.—The total product, including the yield of imported ores, increased to 231,270,622 pounds, or 115,635 short tons, during 1888, which is 46,053,291 pounds more than the product of 1887. During the first quarter of 1889 the production was increasing at even a more rapid rate. The prices received by American producers averaged 15½ cents per pound for Lake copper, 14½ for Arizona and 14 for other districts; making the total value $33,833,954. Montana led in the production, making 97,897,968 pounds. Consumption was somewhat reduced by the high prices.

Lead.—The product increased to 180,555 short tons from 160,700 tons in 1887. The increase was due principally to the heavier receipts of lead in Mexico silver-lead ores from 15,000 tons in 1887 to over 27,000 tons in 1888. The average price in New York was 4.41 cents per pound. The production of white lead, chiefly from pig lead, was 85,000 short tons, valued at $10,680,000.

Zinc.—The erection of new works and the extension of old ones led to a further notable increase in the production of zinc in 1888. The additions to capacity were fairly uniformly distributed in the West, East, and South. Production in 1888, 55,903 short tons, with a total value of $5,500,855; in 1887, 50,340 tons, worth $4,782,300. The production of zinc white in 1888, directly from ores, was 20,000 short tons, worth $1,600,000.

Quicksilver.—The product was 33,250 flasks (of 76½ pounds each) from California, a decline in that State of 510 flasks from 1887 in spite of a very satisfactory price, which averaged $42.50 per flask, making the total value $1,413,125. No new valuable deposits were discovered in 1888, and without them it is not probable that the yield of quicksilver will increase.

Nickel.—The industry remains unchanged except for indications of further developments at Lovelock in Nevada, and Riddle, Oregon. The product includes 190,637 pounds of metallic nickel, valued at $114,382, at 60 cents per pound, and 4,545 pounds, worth $1,136, exported in ores and matte. Total value, $115,518. The corresponding value in 1887 was $133,200.

Cobalt oxide.—The total product, including the contents of the exported ores and matte, was 12,266 pounds, worth $18,441. In 1887 the total was 18,340 pounds, worth $18,774, the lower rate of value in that year resulting from a larger proportion of exported nickel in matte and ore. The price of cobalt oxide remained at $2 per pound.

Chromium.—The product declined from 3,000 tons in 1887 to 1,500 tons in 1888. The average price in San Francisco remained $15 per ton. Increased operations are probable in 1889.

Manganese.—The product of manganese and manganiferous iron ores in the United States in 1888 was 239,460 tons, valued at $876,215. Of this amount some 25,400 tons would be classed as manganese ores; the remainder as manganiferous iron ores. Of the manganiferous iron ores 11,462 tons, averaging 11 per cent. of manganese, and 189,574 tons, averaging 4 per cent. of manganese, were from the Colby mine, Mich. In addition to the above, some 60,000 tons of argentiferous manganese ores, valued at $10 a ton, chiefly for the silver contained in them, were produced in the Rocky Mountain region.

Aluminum.—The past year was more promising than ever before for the production of cheap aluminum. The production of metallic aluminum as an industry distinct from the production of alloys began toward the close of the year, and 500 pounds had been made up to December 31; the production of 3,000 pounds since then indicates that the industry may continue. The exact amount of alloys produced by the Cowles process has not been furnished, but was not markedly different from the product of 1887, when 18,000 pounds of aluminum contained in bronze and ferro-aluminum were produced. The price for metallic aluminum declined to as low as $4.50 per pound for less favored brands.

Platinum.—Including the platinum and iridium separated from gold by the assay offices, and that saved in placer gold mining, the product was about 500 ounces, valued at $2,000.

FUELS.

Coal.—The total production of all kinds of commercial coal in 1888 was 142,037,735 short tons (increase over 1887, 18,022,480 tons), valued at the mines at $204,221,990 (increase $30,625,994). This may be divided into Pennsylvania anthracite 43,922,897 short tons (increase, 4,416,642 short tons), or 39,216,872 long tons, including 38,145,718 long tons shipped by the railroads and canals and reported by their statistician, Mr. John H. Jones, and 1,071,154 long tons sold to the local trade, at the mines (increase 3,943,430 long tons), valued at $85,649,649 (increase $6,284,405); all other coals, including bituminous, brown coal, lignite, small lots of anthracite produced in Colorado and Arkansas, and 4,000 tons of graphitic coal mined in Rhode Island, amounting in the aggregate to 98,114,838 short tons (increase, 13,605,838 tons), valued at $118,572,341 (increase, $24,341,589).

The colliery consumption at the individual mines varies from nothing to 8 per cent. of the total output of the mines, being greatest at special Pennsylvania anthracite mines, and lowest at those bituminous mines where the coal bed lies nearly horizontal, and where no steam power or ventilating furnaces are used. The averages for the different States vary from 2 to 6.4 per cent., the minimum average being in the Pennsylvania bituminous, and the maximum average being in the Pennsylvania anthracite region.

The total output of the mines, including colliery consumption, was: Pennsylvania anthracite 41,624,610 long tons (increase over 1887, 4,045,863 long tons), or 46,619,564 short tons (increase, 4,531,367 short tons); all other coals, 102,039,838 short tons (increase, 14,152,478 tons), making the total output of all coals from mines in the United States, exclusive of slack coal thrown on the dumps, 148,659,402 short tons (increase, 18,683,845 tons), valued as follows: Anthracite $89,020,483 (increase $4,468,302); bituminous $122,497,341 (increase $24,492,685); total value $211,517,824 (increase, $28,960,987). The above figures show a notable increase in 1888 over 1887 in the aggregate output and value of both anthracite and bituminous coal, although not so great an increase as occurred in 1887 over 1886 in the value of the anthracite, or in the total tonnage of the bituminous coal.

Coke.—The production of coke in the United States in 1888 was 8,527,560 tons, valued at about $14,000,000. Pennsylvania produced by far the largest amount, the Connellsville region alone producing 4,955,553 tons; West Virginia, 528,533 tons; Alabama, 518,511 tons; Tennessee, 385,693 tons, and Virginia, 149,099 tons.

Petroleum.—The product of petroleum in the United States in 1888 was 27,346,018 barrels (of 42 gallons each), valued at about $24,598,559. Of this amount Pennsylvania produced 16,491,083 barrels; Ohio, 10,011,868 barrels; West Virginia, 119,448 barrels; California, 704,619 barrels; and other States, 20,000 barrels.

Natural Gas.—The amount of natural gas consumed is given in coal displacement; that is, the amount of coal displaced by the use of natural gas. It is estimated that the amount of coal displaced by natural gas in the United States in 1888 was 14,163,830 tons, valued at $22,662,128. Of this amount 12,543,830 tons were displaced in Pennsylvania; 750,000 tons in Ohio, and 660,000 tons in Indiana.

STRUCTURAL MATERIALS.

Building stone.—Direct returns from producers of the various kinds of building stone show that there was but a small gain in value over the figures of 1887. The value of the stone produced in 1888 is $25,500,000, or $500,000 more than in the preceding year.

Brick and tile.—Value, $48,213,000. This figure represents only a small gain over 1887. This is due rather to increase in the number of manufacturing plants than to increased production at the older and more important sources of supply; in fact, many of the latter show a falling off in production. Prices also were generally somewhat lower than in 1887.

Lime.—The production is estimated at 49,087,000 barrels, with an average value of 50 cents per barrel, making a total of $24,543,500 as the value of the year's product. These figures are not largely in advance of those for 1887, and the gains are not so much the results of increased production in the leading lime regions as in localities of minor importance.

Cement.—The amount of cement produced in 1888 is less than for 1887, being 6,253,295 barrels for 1888, valued at 72½ cents per barrel, making $4,533,639 as the value of the year's product.

ABRASIVE MATERIALS.

Burhstones.—The product which is used for grinding cement, plaster,

paints, feed, etc., comes from New York, Pennsylvania, and North Carolina, and is valued at $150,000.

Grindstones.—Ohio and Michigan furnish practically all the sandstone from which grindstones are made. The product in 1888 increased slightly, 41,000 long tons, worth $281,800, being produced, against 37,400, worth $224,400 in 1887. The price varied from $6.50 to $10 per ton at the quarries before being finished into grindstones.

Corundum.—Production is limited to the old mines in North Carolina and Georgia; 589 short tons, valued at $91,620, were produced in 1888 against 600 tons in 1887.

Oilstones and whetstones.—The production of novaculite from Arkansas increased slightly, making the total, including Labrador oilstone, etc., 1,500,000 pounds, valued at $18,000 in the rough state.

MISCELLANEOUS.

Precious stones.—No systematic mining was carried on in search of gems in 1888. But in mining for other substances and in chance discoveries, gems worth $64,850 in the rough state, and gold quartz worth $75,000 were found.

Phosphate rock.—The production declined to 433,705 long tons, but the total increased slightly to $1,951,673 on account of better prices. The trade in manufactured fertilizers was very prosperous.

Marls.—The production in the Southern States, particularly in Virginia, North Carolina, Alabama, Mississippi, and Florida, is increasing, while the product of New Jersey did not vary from 1887. About 600,000 tons, valued at $300,000, were produced.

Salt.—The industry shows only slight changes: In 1888 the production was 8,055,881 barrels of 280 pounds, valued at $4,377,204. In 1887 the product was 8,003,962 barrels, worth $4,093,846. Kansas became a commercial source of salt in 1888, producing 155,000 barrels with a prospect of still greater increase in 1889.

Bromine.—The product was 307,386 pounds, worth $95,290, an increase from 199,087 pounds in 1887, worth $61,717. The price remained at 31 cents per pound.

Borax.—The production was restricted to 7,589,000 pounds, worth $455,340, at 6 cents per pound for the average quality. In 1887 the product was 11,000,000 pounds, worth 5 cents per pound.

Sulphur.—The sulphur refinery in Utah was partially burned. This and litigation over the property prevented any production in 1888. The supply came principally from Sicily, with small importations from Japan. It was practically all made into sulphuric acid.

Pyrites.—Production 54,331 long tons, valued at the mines at $167,658: a slight increase in quantity over the previous year.

Barytes.—The production from Missouri, Virginia, and New York increased to 20,000 long tons, worth at the mines $110,000. In 1887 the product was 15,000 long tons, worth $75,000.

Gypsum.—The domestic supply comes principally from Ohio and Michigan with smaller amounts from New York, Virginia, Kansas, Colorado, California, Dakota, and Utah. The product in 1888 was 96,000 short tons of crude gypsum, valued at $430,000. A large portion of the supply is imported from Nova Scotia, where 126,118 tons, worth $121,579, were produced in 1888.

Ozocerite.—From the region of Soldier's Summit, Utah, about 20,000 pounds of crude mineral were produced, worth $1,000 in New York, where the material was sold. An increase is probable in 1889.

Soapstone.—Production about 15,000 tons, worth $50,000 before shipment.

Asphaltum.—The product of 1888 includes 700 tons of gilsonite mined in Utah; 3,100 tons of ordinary asphaltum, principally from California, and 50,000 tons of bituminous rock quarried in California for pavements in competition with asphaltum; total value, $331,500.

Feldspar.—The consumption for potters' use declined to 8,700 long tons, worth, in Trenton, New Jersey, $50,000. In 1887 10,200 long tons were produced, worth $56,100.

Flint.—For potters' use the consumption was 16,250 long tons. Including that for sand-paper and for glass, the consumption was about 30,000 tons, worth, unground, $175,000.

Potters' clay.—The consumption included 18,000 long tons of kaolin or china clay, 5,250 tons of ball clay, and 13,500 tons of fire clay, worth altogether $300,000.

Mica.—Owing principally to the use of smaller sizes in stoves the production of sheet mica decreased from 70,500 pounds in 1887 to 48,000 in 1888, valued at $70,000. There is increased demand for mica waste.

Mineral paints.—The product, including ocher, metallic paints, and small amounts of umber and sienna, increased to 24,000 long tons, valued at $380,000.

Graphite.—The production of pure graphite was limited to Ticonderoga, New York, and is reported as unchanged. The total production of pure material was 400,000 pounds, worth $33,000. Small amounts of less pure material for foundry facings, etc., were produced in North Carolina, and at Cranston, Rhode Island.

Fluorspar.—The production, limited to the neighborhood of Roseclare, Ill., and Evansville, Ind., is reported at 6,000 tons, worth $30,000, an increase of 1,000 tons over 1887.

Infusorial earth.—The product came principally from Maryland, and amounted to 2,500 short tons, worth, before shipment, $12,500.

Zircon.—During 1887 and 1888, 25 tons of zircon were mined, principally in Henderson county, North Carolina, and sold for $10,000 for the manufacture of incandescent gas burners. About four tons of monazite, one ton of allanite, 600 pounds of samarskite, and $500 worth of yttrium minerals were produced for the same use. About six tons of monazite and five tons of cerite were also imported.

Mineral waters.—Amount sold in 1888, 9,628,568 gallons, valued at $1,709,302. In 1887 the product was 8,259,609 gallons, worth $1,261,473.

Totals.—The total value of the minerals produced in 1888 was $501,669,931. It is recognized that this is the sum of the values of substances taken in various stages of manufacture, and hence not strictly comparable with each other; still it is the most valuable means for comparing the total products of different years. The result is an increase of nearly $50,000,000 beyond the value of the product of 1887. In that year nearly every mineral industry showed an increase, and hence an increased total was evident. But the fact that the increase was so very large was due to rather exceptional conditions in a few important industries, and it could not reasonably be expected that a similar combination of circumstances would result in even a larger total value for 1888. Nevertheless the unprecedented stimulus given to the production of copper, by an artificial price, increased the total value of that product nearly $13,000,000, or nearly enough to offset the decline in the total value of pig iron. The other important factors in the increase were coal and the other fuels which followed the increased quantity of metals. With the anticipated decline of copper to the normal demand, a decline in the total value of the product in 1889 will not be inconsistent with the natural development of our mineral resources.

METALLIC PRODUCTS OF THE UNITED STATES IN 1888.

		Quantity.	Value.
Pig iron, spot value	long tons.	6,489,738	$107,000,0 0
Silver, coining value	troy ounces.	45,731,632	59,195,000
Gold, coining value	troy ounces.	1,604,927	33,175,000
Copper, value at New York City	pounds.	231,270,622	33,833,954
Lead, value at New York City	short tons.	180,555	15,924,951
Zinc, value at New York City	short tons.	55,903	5,500,855
Quicksilver, value at San Francisco	flasks.	33,250	1,413,125
Nickel, value at Philadelphia	pounds.	195,182	115,518
Aluminum, value at Philadelphia	pounds.	19,000	65,000
Antimony, value at San Francisco	short tons.	100	20,000
Platinum, value crude at New York City	troy ounces.	500	2,000
Total			$265,245,403

NON-METALLIC MINERAL PRODUCTS OF THE UNITED STATES IN 1888 (SPOT VALUES).

		Quantity.	Value.
Bituminous coal	long tons.	91,106,998	$222,497,341
Pennsylvania anthracite	long tons.	41,624,610	89,020,483
Building stone			25,500,000
Lime	barrels.	49,087,000	24,543,500
Petroleum	barrels.	27,346,018	24,598,559
Natural gas			22,662,128
Cement	barrels.	6,253,295	4,533,639
Salt	barrels.	8,055,881	4,377,204
Limestone for iron flux	long tons.	5,438,000	2,719,000
South Carolina phosphate rock	long tons.	433,705	1,951,633
Zinc-white	short tons.	20,000	1,600,000
Mineral waters	gallons sold.	9,628,568	1,709,302
Borax	pounds.	7,589,000	455,340
Gypsum	short tons.	96,000	430,000
Manganese ore	long tons	25,500	255,000
Mineral paints	long tons.	24,000	380,000
New Jersey marls	short tons.	600,000	300,000
Pyrites	long tons.	54,331	167,658
Flint	long tons.	30,000	175,000
Mica	pounds	48,000	70,000
Corundum	short tons	589	91,260
Sulphur	short tons.		
Precious stones			64,850
Gold-quartz, souvenirs, jewelry, etc			75,000
Crude barytes	long tons.	20,000	110,000
Bromine	pounds	307,386	95,290
Feldspar	long tons	8,700	50,000
Chrome iron ore	long tons.	1,500	20,000
Graphite	pounds.	400,000	33,000
Fluorspar	short tons	6,900	30,000
Slate ground as pigment	long tons.	2,500	25,000
Cobalt oxide	pounds.	12,266	18,441
Novaculite	pounds.	1,500,000	18,000
Asphaltum	short tons.	53,800	331,500
Asbestos	short tons.	100	3,000
Rutile	pounds.	1,000	3,000
Total			$328,914,528

RESUME OF THE VALUES OF THE METALLIC AND NON-METALLIC MINERAL SUBSTANCES PRODUCED IN THE UNITED STATES IN 1888.

Metals	$256,245,403
Mineral substances named in the foregoing table	328,914,528
	$585,159,931
Estimated value of mineral products unspecified	6,509,000
Grand total	$591,669,931

Steel Making in Birmingham.

When Mr. Fred. Sloss became interested in the Henderson Steel Co., of Birmingham, some months ago, the *Manufacturers' Record* said that it probably meant some important work towards the practical developement of steel making there. This has proved true. The company has decided to spend $60,000 in building a new plant with all the improvements that their long experimental tests have shown to be advisable. In referring to this, Mr. Sloss said:

The present Henderson plant has made the first really fine razor and tool steel that has ever been made in this country. I made a test of the Henderson steel, at our quarries, where Diamond drills made of magnificent steel are used. Our blacksmith beat out the ingot and made a tool that stood twice as long as Black Diamond steel.

Somebody must lead out in this matter of steel making, and we have decided to do it. We have learned by experience the weak and strong points of the Henderson furnace, the first of its kind ever built, and what we have to do is to correct mechanical defects that rendered the furnace frictionary.

The great trouble with the present Henderson steel plant has been that the dolomite bottom took up the phosphorus, and a percentage of the bottom was converted into slag, making it necessary to put in new bottoms very frequently. We have now put in a bottom of material that does not do this. All dephosphorization is now done by oxidizing the phosphorus and silica and by the peculiar composition of gases converting the phosphorus into phosphorated hydrogen. The experiments made 18 months ago showed 35 per cent. of the phosphorus to be unaccounted for, and we have no doubt it passed off as phosphorated hydrogen in the gases. The Henderson process is an incontrovertible success.—[Baltimore Manufacturers' Record.

INDUSTRIAL SUMMARY.

New Enterprises :—

IRON AND STEEL.

An iron foundry will be built at Americus, Ga., by Hegerman & Bayard.

Starns, Rogers & Co. are about to establish a foundry and machine works at Pueblo, Col.

The new Montreal Rolling Mills Co. have begun the erection of their building, near the Merchants' Cotton Mills, at St. Henri, Quebec. This company has acquired there 140,000 feet of land, and their buildings, which will be 200x120 feet, will cost between $25,000 and $30,000. They have been granted 20 years' exemption from taxation. Wrought iron pipe will be a specialty.—[Canadian Manufacturer.

A project is on foot to establish another iron rolling mill for the production of bar iron at Kingsville, Ont., and to utilize natural gas for that purpose. It is proposed to erect a plant which will turn out 20 tons finished iron per day to start with. A thoroughly practical man, who has had long experience in the business, is ready to take his quota of stock and aid the enterprise. At present prices the profits are said to be over $12 per ton.—Canadian Manufacturer.

MACHINERY.

A. W. Steinbacker and George Komp have incorporated the Steinbacker-Komp Machine Co., at Louisville, Ky., for the manufacture of machinery. The capital stock is $6,000.

Incorporated: Meyer-Kiel-Grant Rotary Engine Manufacturing Co., at Chicago; capital stock, $300,000; incorporators, Frederick Myer, Joseph S. Kiehl and Alexander Grant.

Enlargements, Additions, etc.:—

The Sharon Steel Casting Co., of Sharon, Pa., is increasing the capacity of its works for producing open-hearth steel castings.

The Columbia Rolling Mill Co., whose works are at Jersey City, N. J., has bought 100 tons of mill machinery to be delivered before June 15. It is intended to have the boilers, engines and machinery all in position by July 15.

The Watkins Machine Co., of Boston, Mass., will increase its capital stock so as to purchase the interests and premises of the Watkins Hot Water Heater Co., of Nashua, N. H., and Quincy, Mass., and to control and manage the same.

At the special meeting of the stockholders of the Fall River, Mass., Iron Works Co., held at their office, May 24, it was voted to increase the capital stock $100,000, making the entire capital of the corporation when so increased, $500,000,

A contract for an important addition to their plate mills has just been given by Huston & Sons, of Coatesville, Pa. The new mill will be erected south of the present works, and will be made entirely of iron and fitted up with the most improved modern machinery. Several sets of rolls, 10 feet long and 36 inches in diameter, will be put in, and a large steam crane will be used for conveying the piles to and from the furnace. It is hoped to have the new plant in operation by January of next year.

Fires and Accidents :—

The Batesville & Brinkley Railroad Co. will rebuild their machine shops, recently burned at Batesville, Ark.

The Buffinton steel works, at Burlington, Ia., were destroyed by fire on the 29th ult. Loss, $50,000; insurance, $27,000. The works employed about 100 men.

The old nut and bolt works at Uniontown, Pa., occupied by the Uniontown Machine Co., was burned to the ground June 3. Loss, about $12,000; insurance, $7,700.

Failures, Shut-downs and Wage Matters :—

A 10 per cent. reduction has been ordered in the Dickson Co.'s locomotive works at Scranton and Wilkesbarre, Pa. The reduction is to affect all, from the president down. Competition and dullness in trade are the reasons given.

Works Starting Up:—

The charcoal furnace of the Jefferson Furnace Co., at Oak Hill, O., has been lighted.

Joanna Furnace, Berks County, Pa., has started up after over two years' idleness. The furnace has undergone extensive repairs, enlarging its capacity, with new engines and boilers, making it one of the finest charcoal furnaces in the State.

General Industrial Notes :—

The citizens of Marlyn, Ind., have voted to donate $40,000 to the Toledo, St. Louis & Kansas City Railway, as an inducement for the road to locate its shops there.

The Lake Erie Iron Co., of Cleveland, O., have ordered another Porter-Hamilton engine from William Tod & Co., of Youngstown, O., for their eight-inch mill. The arrangement of the gearing is similar to that on their nine-inch mill, and made by the same builder about a year ago.

The name of the Milwaukee Machine Tool Co. has been changed to the Kempsmith Machine Tool Co., taking this name from Mr. Frank Kempsmith, who is at the head of the mechanical department. The company is to manufacture iron and brass working machinery, and are about to bring out a new milling machine.

The fact that the Valley Iron Works, of Coatesville, Pa., have resumed operations in full for the first time in three years, and that the Brandywine Iron Works and the Viaduct Mills, both of the same place, are now running in full force,would seem to indicate that the plate-mill industry of Eastern Pennsylvania is in a flourishing condition.

Sealed proposals will be received at the Office of the Supervising Architect, United States Treasury Department, Washington, D. C., until 2 o'clock P. M., on the 20th day of June, 1889, for the labor and material necessary in the extension of the boiler vault, removal of old steam boiler, and furnishing and putting in place complete two new steam boilers in the Southeast Court of the Treasury Building, Washington, D. C.

W. P. Davis, manufacturer of machine tools, Rochester, N. Y., informs us that at his works at North Bloomfield, N. Y., he is very busy and is running overtime. He is just bringing out a very heavy spinning lathe, 26″ swing, an unusual lathe as regards size and stiffness. He is making it for the Star Headlight Co., of Rochester; also a special 30″ surface grinding machine to grind strips from 3 to 6″ wide and 30″ long. He thinks this is a machine much needed on the market, as it will be built at a nominal price. He has not had quite as large a sale on his key seaters for the last month as usual, but the sales of his 20″ drills seem to be steadily increasing. He has had some very large orders, principally from the trade, though some large manufactures buy direct. Since establishing his salesroom and office in Rochester, he has taken the agency of one of the largest boiler and engine concerns in the United States, and has already sold several steam plants and is in position to quote very low prices on engine boilers or machine tools delivered in any part of the United States.

Recent Blast Furnace Records:—

Warwick Furnace, at Pottstown, Pa., was successfully blown out on May 28, after a blast of 180 weeks, during which the furnace produced 107,600 tons.

Charlotte Furnace, at Rochester, N. Y., made its largest output, for one month, in May, when an average product of 56 tons a day was attained of No. 1 and No. 2 foundry. The furnace is now making over 60 tons a day, mostly of No. 1.

Soho Furnace, of the Moorehead-McCleane Co., produced 5,520 gross tons of pig iron during the month of April. The two blast furnaces of Shoenberger, Speer & Co. produced 5,354 gross tons of Bessemer pig iron during the same month.

For the week ending on Saturday, the 25th ult., Neshannock Furnace of the Crawford Iron & Steel Co., at New Castle, Pa., turned out 1,411 gross tons of pig iron. This is the largest production, for the same length of time, in the history of the furnace.

The record of the Midland Furnace for May is certainly a good one. This is a charcoal furnace 50x10. The furnace stack is built wholly of fire-brick, 22½ inches thick. The product for May was 1,622 tons, an average daily output of $52\frac{731}{2268}$ tons. The consumption per ton of 2,268 pounds was $81\frac{53}{100}$ bushels.

No. 2 furnace, of the Port Henry Furnace Co., Port Henry, N. Y., has again passed her best previous record, having made last week 498 tons of iron. This is nearly double the best average output of any previous blast, and is believed to be by far the best record of any furnace of its size in the Champlain or Hudson River Valley, not using coke exclusively. Considering the fact that the ores used were all Camplain magnetites, which, while rich in iron, are difficult of reduction, and the fuel principally Delaware and Hudson anthracite coal, the record will perhaps compare not unfavorably with other notable furnace outputs.

Recent "Big Things" in Iron and Steel Works:—

Thirty-six car-loads of pipe are being turned out every 24 hours at the National Tube Works Co., at McKeesport, Pa.

The largest output for a single week of the Jones & Laughlin Steel Works, at Pittsburgh, occurred recently, when 2,350 tons were produced.

The Hartman Manufacturing Co., of Beaver Falls, Pa., have recently made a steel mat for the office of the Hotel Richelieu, Chicago, 41 feet long and 4 feet wide, the largest ever made in the world in one piece. A somewhat smaller one was recently made for the Palmer House, of that city.

The Union Bridge Co., of Buffalo, in connection with Comegys & Lewis, of New York city, under the name of the North & South American Construction Co., got the contract with the government of Chili, South America, to construct 780 miles of railway, build bridges, stations, machine shops, tanks, round houses, 800 cars and 50 locomotives, at a bid of $17,000,000.

Improvements have recently been completed at the Edgar Thomson Steel Works, at Braddock, Pa., by which the capacity of the rail mill has been increased to nine finished rails per minute. The rolls of the blooming mill have been enlarged, and now 1½-ton ingots are made into two blooms, each of which makes three rails. Another saw has been added also, and now three rails can be sawed, instead of two, as before.

On the 16th ult. there were shipped from the Homestead Steel Works of Carnegie, Phipps & Co., Limited, at Homestead, Pa., two large steel plates for government ships. They were 3 inches thick, 9 inches wide and 206 inches long. Each plate weighed 13,000 pounds. The plates were bent in a semi-circle, and are to be used round the pilot-houses of large gun-boats. The work of bending them was done while the plates were cold—the first attempt ever made at such work in the United States. It was so successfully accomplished that the firm are getting ready to fill six more orders of a similar nature. On Saturday, the 18th ult., there were turned at this plant two plates 96 inches wide, 180 inches long and 3 inches thick. Each plate weighed 9,000 pounds. The plates were heated to a cherry red and bent on rolls in the shape of a semi-circle. They were tested to 60,000 pounds tensile strength, and to an elongation of 20 per cent. in eight inches.

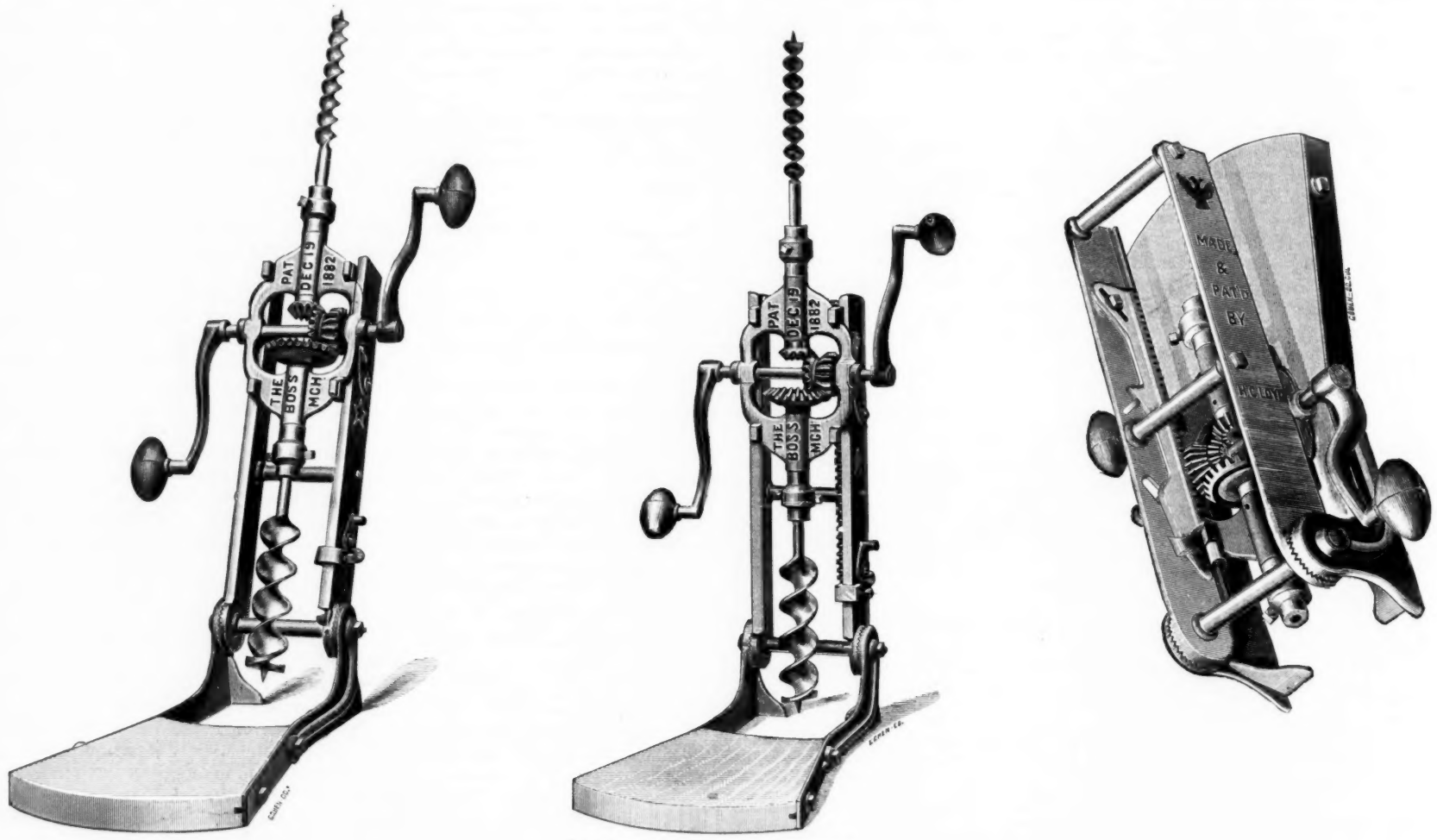
A High Pressure Turbine.

France claims the honor of utilizing the greatest head of water for industrial purposes at Brignond near Grenoble, with a turbine of 9 ft. and 10 in. in diameter, which has worked since 1875 under a head of 1,638 ft., giving a force of 1,500 horse power, with a flow of 300 litres, or about 10.6 cubic feet per second.

TWO-SPEED BORING MACHINE.

That principle in the construction of the "Boss" boring machine, herewith illustrated, which is of greatest importance to carpenters, or any one using boring machines, is the two different speeds. By this feature the operator is enabled to use a two-inch auger with about the same effort required in using a one and one-half inch in any other machine, and for the small auger have a speed two and one-half times faster. Two augers may be kept in the machine, to use either of which it is only necessary to point it downward by first raising the gear frame out of main frame, inverting and replacing it, being particular to keep cog-gearing on right hand side of machine.

It is claimed by the manufacturers that any boring machine having but one set of gears, or, in other words, not possessing the advantage of two separate speed, can not successfully run a large and small auger, as a large one has coarse threads and cuts thick chips, while a small one has fine threads, and cuts thin chips, a much greater effort being required to work the large than the small auger. The "Boss" reduces the speed of the large auger and increases that of the small one, thus properly equalizing the power required to do the work. To run machinery successfully, it should be geared in accordance with the power furnished. The auger will cease to bore at any required depth, clear the chips from the hole, bore at any angle, fold up compactly for placing in tool chest, and everything is firm and solid. There are no springs or shifting gear to get out of order. For further particulars, prices, etc., address J. H. Osborne & Co., Union City, Ind.



TWO-SPEED BORING MACHINE.

THE NEW WAR VESSEL.

BUILDING ADVERTISER, SAN FRANCISCO.

The gratifying news from Washington that Secretary Tracy had awarded the contract for constructing the coast-defense war vessel to the Union Iron Works, of this city, was received on the 4th ult. This recognition by the government of the capabilities of the Union Iron Works is thoroughly appreciated by all interested in construction on the coast. The award of this contract by the Navy Department virtually recommends San Francisco to the whole world as a ship-building-port. The new vessel is to cost $1,628,950, with a guaranty of 5,400 horse-power in the engines, to be developed in part by a system of coil boilers, which are lighter and take up less room on a ship than those of the ordinary pattern. Three firms responded. Cramp & Sons, of Philadelphia, bid $1,614,000; the Union Iron Works, of San Francisco, $1,628,950, and N. F. Palmer & Co., of New York, $1,690,000.

The plans for the new vessel were drawn by Chief Constructor Wilson, in accordance with an act of Congress, approved March 3, 1887, which appropriated $2,000,000 for the increase of the navy, of which $1,700,000 was to be devoted to the construction of an armored coast-defense vessel, and the balance to the construction of a marine torpedo boat. The new vessel is to have a length of 250 feet, a width of 59 feet, 4,000 tons displacement and 5,400 horse-power. The Union Iron Works guaranteed to develop this amount of horse-power, while Cramp & Sons, the lowest bidders, avoided the conditions.

The vessel will be provided with every modern war appliance, and will be protected by a belt of steel 16 inches thick over the engines, boilers and magazines. The parts forward and aft will be covered by steel eight inches thick. There will be two ordinary tubular marine boilers of 1,500 horse-power, and the remaining 3,900 horse-power required will be supplied by coil boilers. These are considered by the French Government as being absolutely perfect, although their use in naval vessels may be regarded as largely experimental.

There will be constructed an armored covering tower 10 inches in thickness, in which is fitted the steering gear, telegraphs, speaking tubes, etc., and the battery will consist of one 110-ton 6-inch breech loader, one 46-ton 12-inch breech loader, one 15-inch pneumatic dynamite gun, six 33-pounder rapid-fire guns, two 6-pounder rapid-fire guns and four 3-pounder rapid-fire guns. The base of the smokestack will be protected by six-inch steel armor. Dynamos and electric search lights will be provided, and accommodations have been made for the captain, ten ward officers and 150 men.

When the vessel goes into action, by taking on water-ballast, she sinks until her deck is 18 inches above the water level, thus diminishing the size of the target exposed to its opponent. The barbettes or gun receptacles are to be of six-inch steel, and the deck will be composed of solid steel two inches thick. The draft will be 14½ feet, and the vessel will have a speed of 26 knots an hour. The ordinary cruising speed is about nine knots an hour, but notwithstanding this the vessel will be able to travel 2,722 miles without renewing her coal supply.

The Union Iron Works will begin work on the vessel immediately. It is expected that its construction will consume three years and six months' time. In design the new vessel will be a departure from any vessel in the navy, and competent naval officials, who have studied the specifications, are of the opinion that it will be the most formidable vessel, for her displacement, of any in the world, and able to cope with anything that sails the sea.

Ocean Racers are Great Coal Consumers.

The new steamship *Augusta Victoria*, of the Hamburg-American Co., has now made the record of the best "first trip," eclipsing that of the *America*, which has stood for five or six years. The passage was reckoned from Southampton, from which point to New York the competition has been quite as keen, though not quite so conspicuous, as between Queenstown and New York. Making the proper allowances, however, the passage exceeds in speed any first performance across the Atlantic. It is true that this high speed is not attained except at a tremendous cost. Considering the consumption of coal even on the crack steamers so lately as ten years ago, it is almost appalling to read that the *Augusta Victoria* used "only" 220 tons of coal a day, or something over 1,600 tons, in itself a cargo for a sailing ship of the first class, during the entire passage. It seems safe to expect that the efforts of the engineers will now be devoted quite as much to the more economical application of power as to the generation of more power by their engines. Commodore Vanderbilt once explained his methods as a "steamboat man" by saying that if he could not run his boats as fast and as well as those of a rival line, and 10 per cent. cheaper, he would go out of the business. The profit represented by a saving in the consumption of coal has become quite as important an object of desire in the Atlantic passenger trade as the attainment of high speed.—[Coal Trade Journal.

THE St. Andrea (Belgium) coal pit is 3,084 feet deep and beats the world.

WHERE OUR IRON ORE COMES FROM.

The knowledge concerning certain iron ore deposits which has become general through the fact that they are located convenient to some of our prominent iron producing centres, or by reason of having been worked for many years, has led to a misapprehension of the true relations which our prominent sources of iron ore supply have to each other. To properly present this matter, Mr. John Birkinbine, Secretary of the United States Association of Charcoal Iron Workers, prepared for the *Transactions of the American Institute of Mining Engineers*, a monograph accompanied by a graphic representation, a reproduction of which we herewith present by the courtesy of the Secretary of the Institute. We believe an examination of the accompanying plate will be a surprise to many of our readers by demonstrating the relative importance of some of our iron deposits. It is a source of regret that the destruction of books of record by fire prevents tracing the output of the Lake Champlain and the Southern Missouri mines through longer periods, for the plate does not indicate the important position that has been held by these localities for many years. Some sources which now produce a small proportion of the ore used, have, in the aggregate, added very largely to the material wealth of the country, and have been of great service in the development of our iron industries.

The estimated production of iron ore throughout the world in the year 1888 was, in round numbers, 50,000,000 gross tons, of which the United States contributed about one-fourth. Great Britain leads this country in production by about 15 per cent., but the output of the United States is practically equal to that of Spain, France, Russia, Austria and Hungary combined. Foreign ore was imported into this country in 1888 to the amount of 587,470 gross tons. A close approximate of the amount of iron ore consumed in the United States in 1888 in its blast furnaces, rolling mills, and for other purposes, is 12,700,000 gross tons.

The Lake Superior region is by far the largest producer of iron ores in the United States. The total output for 1888 was 5,023,279 gross tons, equivalent to about 40 per cent. of all the iron ores mined in the country. The entire output of this interesting region is very close to 41,000,000 tons, divided as follows: The Marquette range produced from 1854 to, and including 1888, 27,130,419 tons; the Menominee range from 1877 to, and including 1888, yielded 8,694,039 tons; the Gogebic range from 1884 to 1888, inclusive, is credited with a product of 3,586,876 tons, and the Vermilion range in Minnesota has shipped from 1884 to, and including 1888, 1,498,209 tons. We, therefore, find that of the total amount of ore won from the Lake Superior region, the Marquette range has contributed 66.5 per cent.; the Menominee range 21.00 per cent.; the Gogebic range 8.8 per cent., and the Vermilion range 3.7 per cent.

The year 1888 shows a larger output for the Marquette range than any other year since its opening, the increase over 1887 being 61,482 tons, and out of the 74 mines on the Marquette range 41 were active, producing 1,921,525 tons of iron ore, equivalent to 38.3 per cent. of the 1888 product of the Lake Superior region. Out of these active mines, three produced over 200,000 tons each, three between 100,000 and 200,000 tons, and five between 50,000 and 100,000 tons.

The Menominee range contributed 34,304 tons less in 1888 than it did in 1887, the total for 1888 being 1,165,039 tons obtained from 22 mines out of 36 on the lists. Of these mines one exceeded an output of 200,000 tons, four produced between 100,000 and 200,000 tons, and four gave products of between 50,000 and 100,000 tons. The Menominee range yielded 23.2 per cent. of the total of the Lake Superior product for 1888.

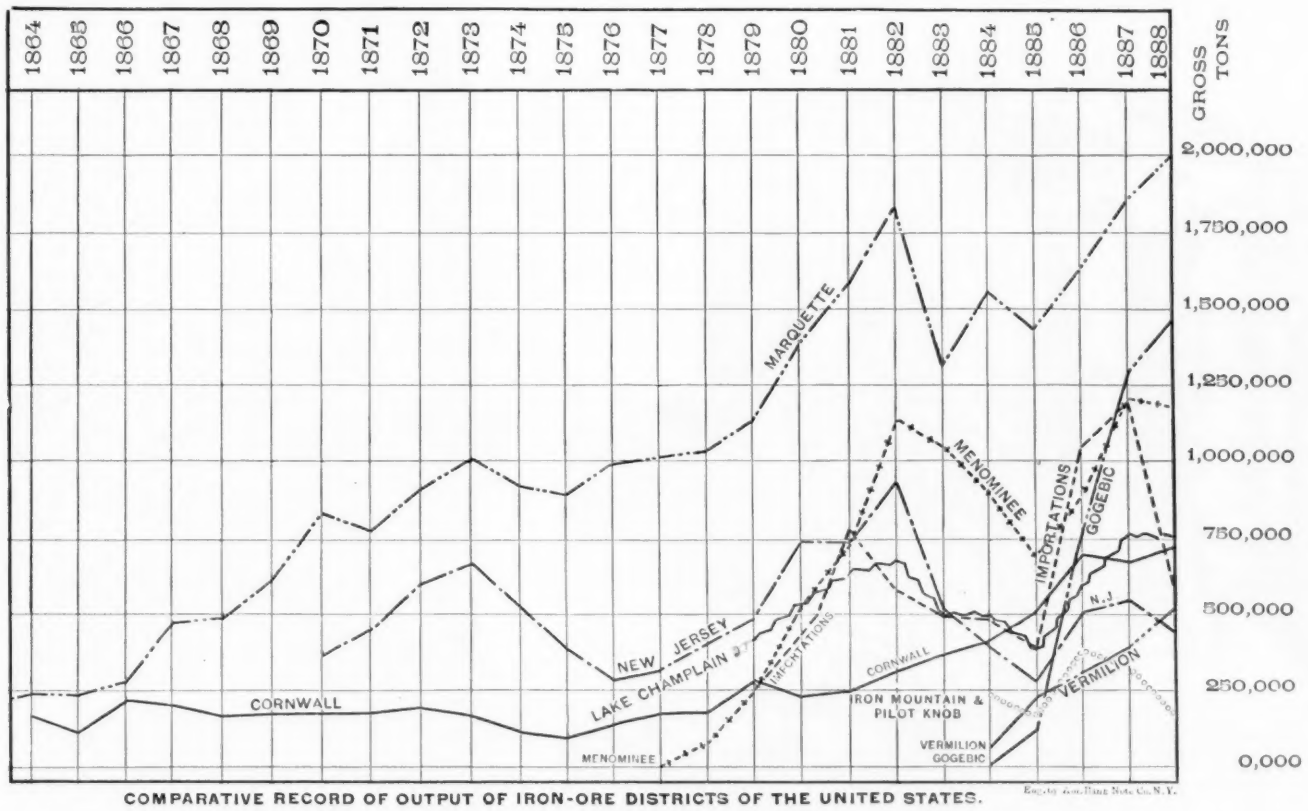
The Gogebic range which, in 1887, outstripped the Menominee range and took second place as a producer, excelled its previous record by 134,497 tons, producing a total of 1,424,762 in 1888, or 28.9 per cent. of the Lake Superior output. This ore came from 21 mines, out of a total of 34 on the list, one of which yielded, in 1888, over 400,000 tons, and one over 200,000 tons, two over 100,000 tons, and three produced 50,000 tons and over.

The Vermilion range also reached its largest output in 1888, namely 511,953 tons, or an increase over 1887 of 117,701 tons, and this range is credited with 10.1 per cent. of the total Lake Superior product for last year. There are but two mining companies on the range, one of which contributed 457,000 odd tons, and the other 55,000 tons.

The figures herein given demonstrate the extent to which iron ore mining has been carried in the Lake Superior region, and the volume of ore handled is the more remarkable when the high percentages of iron in the ores is considered. The greater portion of the ores mined are red hematites, varying from the soft to the hard specular varieties, but some magnetites are obtained, and in a few deposits the hydrated condition of the ore places some of it in, or close to, the limits of brown hematite. The distance from these mines to blast furnaces, and the expense of transportation makes it necessary that a standard of quality should be maintained which is above the requirements of most of the other iron producing districts. This standard may be considered as approximating a yield of 60 per cent. of iron when dried at 212 degrees, but many ores exceed this requirement.

The Cornwall ore banks, in Pennsylvania, contributed to the supply of iron ore for the year 1888, 722,921 gross tons, an amount greater than ever taken out in one year from this deposit, which has been operated for 150 years and produced an aggregate of 9,395,923 gross tons of iron ore.

The development of this property has naturally been stimulated by the advance in iron production, for the deposit had not yielded a half million tons in any year until 1885, and 1879 was the first year that over a quarter of a million tons were mined. Within the past decade a total of 4,421,000 tons were obtained; this is equivalent to nearly one-half of the aggregate output of the Cornwall ore hills. The ease with which soft magnetites are mined from the Cornwall ore hills, and the convenience of the deposit to fuel supply and to blast furnaces, would permit of a still greater output if efforts were made to distribute the ore over a larger area than is now the case. It is, however, equitable in comparing the Cornwall ore hills with the Lake Superior region to note the fact that the ore which yields about the same per cent. of iron as the Cornwall ore is carried to the waste piles of many of the Lake Superior mines, and an output of 575,000 to 600,000 tons of the average Lake Superior ore as shipped, would produce as much iron as the 723,000 tons taken from the Cornwall ore hills. The sulphur and copper in the Cornwall ore does not interfere with its use in producing Bessemer iron, the former being generally reduced by roasting with solid fuel in the Gjers and Grittinger kilns. Lately the Davis Colby kiln has been applied, and waste gases from the blast furnace employed as fuel. The percentage of copper is not sufficient to materially influence the use of the ore.



COMPARATIVE RECORD OF OUTPUT OF IRON-ORE DISTRICTS OF THE UNITED STATES.

Engd by Am. Bank Note Co. N.Y.

Some of the Lake Champlain deposits have been operated for nearly a century, and others were opened at later dates. The total output of this district to date is estimated at 15,147,000 gross tons, of which 5,794,000 gross tons have been mined in the last decade. The largest producers are the mines at Mineville, near Port Henry, from which 9,150,000 gross tons are estimated to have been obtained. The total production of the Lake Champlain district in 1888 was obtained as follows:

From mines near Port Henry, New York	419,009	gross tons.
From mines of Chateaugay Ore and Iron Co.	250,500	" "
From mines near Crown Point	74,910	" "
From other mines, estimated	45,000	" "
Total	789,419	

This makes the Lake Champlain district outrank the Cornwall for the year. New Jersey fell considerably behind former years in 1888, the total being

447,738 gross tons as against 547,889 gross tons mined in 1887. The aggregate product of the New Jersey mines since their opening, dating back into the last century, is estimated at 16,500,000 gross tons.

A district which has become quite prominent as an iron producer is that portion of Missouri in which the Iron Mountain and Pilot Knob are located, but the quantity of ore that has been obtained from this district has lately been less than is generally supposed. The total amount shipped in 1888 was 160,000 gross tons, and the 40 or more years in which iron has been taken from this district, a total of about 4,000,000 tons has been obtained, of which 70 per cent. came from Iron Mountain.

We are only able to form an approximation of the ore used in the Southern States based on the pig-iron out-put for the year, allowance being made for shipments of ore from one State to another. A calculation made in this way shows that in 1886 the States of Virginia, North Carolina, Georgia, Alabama, Tennessee and Kentucky produced about one and three-quarter million gross tons, while in 1887 the output of the mines slightly exceeded two million tons. The consumption of ore in these States in 1888 approximated 2,500,000 gross tons. Of this amount fully seventy per cent. was red hematite or fossil ore, about twenty-five per cent. brown hematites, and probably about five per cent. magnetite. Alabama contributed about 1,000,000 gross tons, Tennessee is estimated to have supplied 615,000 gross tons, and Virginia between 450,000 and 500,000 tons.

Authentic records of the quantity of iron ore imported are not obtainable, except, since the year 1879, but these figures show that in the past ten years an aggregate of 6,340,062 gross tons of iron ore were brought into the United States from foreign countries.

From the foregoing data it is impossible to arrange the various sources of iron ore supply according to their amounts of ore produced in 1888. It is not claimed that the relative order or the quantities are absolutely correct, but they are as nearly so as it is possible to make them without actual returns from numerous small mines.

RELATIVE IMPORTANCE OF VARIOUS DISTRICTS IN 1888.

Order.	Name.	Gross tons mined in 1888.
1.	Marquette range, Lake Superior region,	1,921,525
2.	Gogebic " " " "	1,424,762
3.	Menominee " " " "	1,165,039
4.	Alabama, (estimated,)	1,000,000
5.	Lake Champlain district, New York,	789,419
6.	Cornwall ore hills, Pennsylvania,	722,921
7.	Other Pennsylvania mines (estimated,)*	700,000
8.	Tennessee, (estimated,)	615,000
9.	Foreign ores,	587,420
10.	Vermilion range, Lake Superior region,	511,953
11.	Virginia, (estimated,)	450,000
12.	New Jersey,	447,738
13.	Missouri, †	160,000

The important position which various districts hold as contributors to our mineral wealth will also appear from the total amount of ore which is estimated to have been taken from them, thus:

TOTAL ESTIMATED OUTPUT TO DATE.

Marquette range, Lake Superior district,	27,130,419	gross tons.
New Jersey, (estimated,)	16,500,000	" "
Lake Champlain district,	15,147,000	" "
Cornwall ore hills,	9,395,923	" "
Menominee range, Lake Superior district,	8,594,037	" "
Iron Mountain and Pilot Knob, Missouri,	4,000,000	" "
Gogebic range, Lake Superior district,	3,586,876	" "
Vermilion range, Lake Superior district,	1,498,209	" "

*The total output of Pennsylvania, including the Cornwall ore hills, would probably make that State rank as third.

†Shipments from Iron Mountain and Pilot Knob only.

The above amounts are merely presented to indicate the quantities taken from such sources as could be traced. In comparing them time must be a factor, for iron mining has been followed for many years in the Lake Champiain district, in New Jersey, at the Cornwall ore hills, etc., while the Menominee range is but eleven, and the Gogebic and the Vermilion but five years old.

THE BEECHER AIR-WARMING FURNACE.

Fig. 1 herewith shows the Beecher furnace of 1862, for which letters patent were granted August 27th, 1861, and the first constructed having a series of air-heating pipes inside the drum. In the construction of this furnace, the theory was that the air-heating pipes would act on the same principle as the chimney, the hotter they were heated the more rapidly the air would pass through them, but when put into practice quite good results were had when moderately heated; but when necessary to urge the fire in cold weather it was found that in proportion as the pipes were overheated that the air would cease to flow through them. The difference in the application of the heat to the chimney and the air-heating pipes is, that the fire is on the inside of the chimney, and to the pipes it is applied on the outside. When heat is applied on the outside of a pipe the heat rays are from the circumference to the center of the pipe, forming cross rays of heat; when this action takes place all action of the air through them is stopped, after the temperature rises to a certain degree. Another bad feature in placing the pipes around the top of the fire-pot, was that they were exposed to the direct action of the fire, and the consequence was that they would soon burn out.

Theoretically this construction of an air-heating furnace was supposed to be a success, but when put into practice it had to be abandoned, and after many years of experiments they have secured a device which has entirely overcome all difficulties which were met in the furnace of 1862.

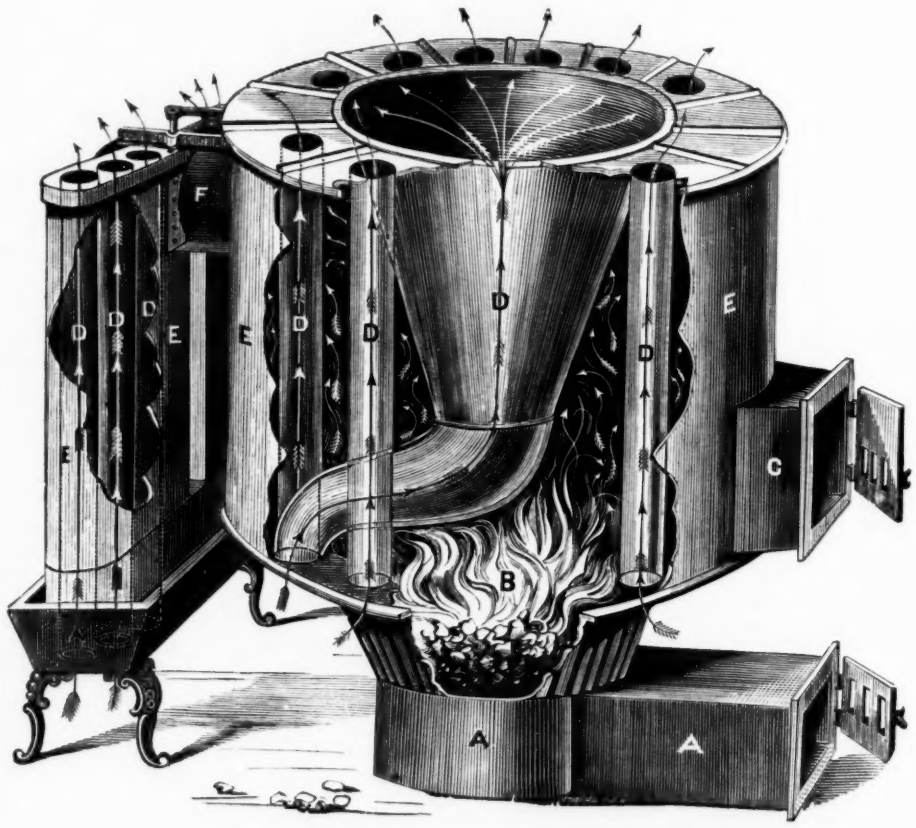


FIG. 1. THE BEECHER AIR-WARMING FURNACE.

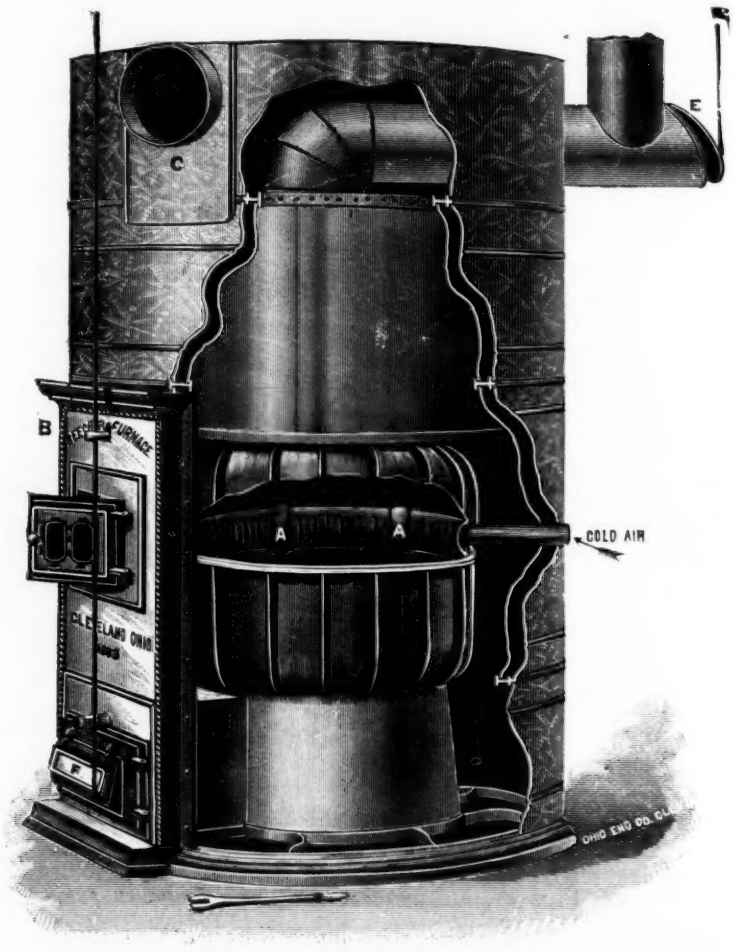


FIG. 2.

Fig. 2 shows the Beecher furnace of 1888. In the construction of the new Beecher furnace the makers have added many very important improvements, principally in the combustion of fuel, which is as near perfect combustion as is possible to get, giving a larger amount of heat from a given amout of fuel than by any warm-air furnace made. A new device added this year is the gas plates AA, having a series of vertical slots so as to more fully distribute the heated air with the gases arising from the coal, with the combination of the top central draft retaining the heat and producing a higher temperature in the combustion chamber.

The manufacturers claim to get the desired results, making a direct saving of 25 per cent. of fuel over any other furnace made. In comparing the furnace of 1862 with the present one of 1888, a very marked change has been made. Referring to these changes the manufacturers say: "In the former the drum radiator was placed on the fire-pot. We found that the air-heating pipes around the fire-pot would soon burn out by having the direct action of the fire. In the description given of our furnace of 1862 as to the air-heating pipes not acting when over-heated, we will now state the reason why: The air would not pass through them although standing perpendicular and open at either end; the fire being applied on the outside of them the heat radiated from the circumference to the center, forming cross rays of heat which makes an effectual damper, not allowing any passage of air through them; the consequence was that they were of no use when most wanted, and for this reason would

soon burn out. To remedy this defect we put absorbing plates into them. These plates absorb the heat from the sides of the pipes as fast as generated, and breaking up the cross radiation prevents the pipes from getting overheated, and allows the air to pass freely through them and take up the heat as fast as generated; and should it be necessary to urge the fire at any time, give the furnace plenty of cold air and plenty of exit for the heated air to escape, or open all the registers, and it will be found by this simple device a multitude of sins which are common with hot-air furnaces are overcome. The law of cross radiation has been entirely overlooked by makers of furnaces, and this is why there is a general complaint that the air from furnaces is so excessively heated that they have to be provided with water pans to doctor up the air so as to be able to live in it. After the air is once robbed of its vital parts which go to support life, nothing but nature can restore it back to its original state. These difficulties which have been met in the use of furnaces, namely: overheating the air, imperfect combustion, costing too much for fuel for the amount of heat they furnished, have all been overcome in the Beecher furnace by those simple devices which have been added as they were required." For further particulars, prices, etc., address the Beecher Furnace Co., Cleveland, O.

FOREIGN COMMENT.

Copper-Coated Steel Wire.

A new process has been brought out at Vienna, Austria, for the manufacture of copper-coated steel wire for electrical purposes. The old method was galvanic, while, according to the one now proposed, the steel wire will be coated by spirally winding around it very thin copper bands. The object in all such wires is to combine the great conducting power of the copper with the tenacity of the steel.

The Tin-plate Syndicate.

The proposed amalgamation of Staffordshire tin-plate and tin-sheet manufacturers was further advanced at a conference of the representatives of the firms concerned, in Birmingham, week before last. It is not proposed to place shares on the market, except to a limited extent. The syndicate is not being financed by London capitalists, as alleged, but is exclusively confined to a few leading firms, who are buying up the smaller houses. The advancing prices are causing some firms to hesitate about parting with a profitable business. The nominal capital of the concern will be about half a million sterling.

South African Locomotives.

We learn from South Africa that factories are now being built there for producing the various machine tools and appliances required for use in the colony. In the early part of the present year the very first locomotive, which had been built in the British colony, passed successfully through its trial at Durban. This locomotive was built in the workshops of the Natal Government. It is a bogie engine with four coupled wheels. This is intended as the first of numerous similar productions in view of the extraordinary development anticipated in the iron roadways of Southern Africa.—[Iron & Coal Trades Review.

Improvement in Marine Engines.

Recently there was a very successful trial, on the Mersey, of the Turner new steam engine and boiler, which is the invention of Mr. Henry Turner, of Liverpool, consulting engineer, and has been made by George Bayliff & Son (Limited), of the Wirral Foundry, Birkenhead. The engine and boiler were fitted on board the steam yacht *Waterwitch*, and the trials were made under the personal superintendence of Mr. Turner and Messrs. William & Thomas G. Bayliff, and in the presence of several gentlemen connected with and interested in marine engineering. One of the principal new features in the invention is the introduction of an automatic force draught, by which a much more complete combustion of fuel is obtained, waste in this respect being practically reduced to a minimum.—[Iron & Coal Trades Review.

Activity in English Engineering Trades.

The improvement in trade is still reflected by great activity in ship-building and engineering, and in other industries connected therewith. It is estimated that, on some of the Northern rivers particularly, there never were more new vessels on the stocks than now, while the orders in hand are quite sufficient to justify the assertion that there will be plenty of work during the next few months and a large output during the year. The output of marine engines, of steam winches, and other articles required for shipping will also, throughout the country, be very large. In the iron and steel trades generally work is carried on at top pressure, and in some cases, notably the ships' plate and ships' material branches, the supply hardly meets the demand. The cement, brick, salt and foundry trades seem to be everywhere full of activity and ripe with future promise. In locomotive building work is plentiful.—[Colliery Guardian.

Iron Wares in Madagascar.

A French contemporary says that iron hammered but not wrought is easily placed in Madagascar, whether in bars, plates, or other forms, of whatever dimensions. Wrought iron is also easily sold in the form of mattocks, shovels, and to some slight degree domestic utensils, but the latter not so largely as used to be the case, the Hovas being very industrious and rapidly learning to imitate European manufactures. Iron that can be sent in the form of buildings, houses, or shops, which only need wooden or brick fittings to complete them, is acceptable in Madagascar. Sheet iron beaten thin to form the outer covering of packages is also used to a large extent, and at present is mainly supplied from the English markets. Agricultural implements cannot be sold as yet, the colony still being in a rudimentary condition so far as agriculture is concerned. Important concessions have, however, been made for the working of the forests, and so no doubt before long there will be required steam saws and other instruments of a similar description.

Transporting Large Steel Castings.

The Midland Railway Co. recently conveyed the large steel castings, consisting of two 14-ton stern brackets, for one of her Majesty's ships now being built on the Thames, from the works of Thomas Jessop & Sons, Brightside, Sheffield, to London. Owing to the size and shape of the castings both lines of the railway were "fouled" during the transit, and the railway company took the greatest precautions to prevent accident. The whole distance from Sheffield to London was worked as a single line, and was divided into nine sections, each of which was run without a stoppage, and for this purpose nine light engines, each being accompanied by an inspector, were engaged. Before the train could leave Sheffield, at 6:30, Inspector Turk had to arrive from Chesterfield on the first light engine as an indication that the down line was clear to that place, and this was the course pursued at the other eight sections, the train being timed to arrive at St. Pancras at 8:30 P. M.—[Iron & Coal Trades Review.

Cambria Iron Works May Move.

"The question of moving the Cambria Iron Works to another point has been discussed informally," said President E. Y. Townsend, to a Philadelphia *Record* reporter, "but no action of any kind has been taken. There has been one proposition made that the bulk of our plant be established at Erie. The advantages of that point are that the products of our works could be shipped direct into vessels, and ore from the Lake Superior mines could be landed at the furnaces without any reshipment by car. It is true, on the other hand, however, that our coke would cost us more at Erie than at Johnstown.

"It has also been suggested that we should transfer our interests to St. Louis. There we would be able to supply with iron and steel the West and Southwest, which are the growing sections of the country. But, as I say, it is only suggestion that has been heard so far. Before we can do anything at all we must know just how much of our Johnstown plant has been destroyed and how much remains intact. Care for the welfare of the poverty-stricken and dead at Johnstown has prevented us from devoting our attention to our own losses or our future prospects."

It is said that the plan of moving the works to the Eastern seaboard has also been proposed. This would be a move in the same direction as that taken by the Pennsylvania Steel Co. in transferring a part of its plant to the banks of the Chesapeake Bay, in Maryland. It is urged that in the future the iron and steel works of the United States must look to other countries for a sale of their products, and for foreign trade the seaboard offers the greatest advantages. The three points which have principally to be considered are cheap ore and fuel, and facilities for shipment to the center of consumption.

The Smallest Screws in the World.

The smallest screws in the world are made in an American watch factory. They are cut from steel wire by machine, but as the chips fall down from the knife it looks as if the operative was simply cutting up the wire for fun. The fourth jewel-wheel screw is the next thing to being invisible to the naked eye. With a glass, however, it is seen to be a small screw, with 260 threads to the inch, and with a very fine glass the threads may be seen very clearly. These little screws are $\frac{4}{1000}$ of an inch in diameter, and the heads are double the size. About 1,000,000 of them are made a month, but no attempt is ever made to count them. In determining the number, 100 of them are placed on a very delicate balance, and the number of the whole amount is determined by the weight of these. All of the small parts of the watch are counted in this way, probably 50 out the 120. After being cut, the screws are hardened and put in frames, about 100 to the frame, heads up. This is done very rapidly, but entirely by sense of touch instead of sight, so that a blind man could do it just as well as the owner of the sharpest eyes. The heads are then polished in an automatic machine, 10,000 at a time. The plate on which they are polished is covered with oil and a grinding compound, and on this the machine moves them rapidly by reversing motion until they are fully polished.

Purchasing Coke Lands.

W. J. Rainey, of Cleveland, has made another big purchase in the Connellsville coke region. He has acquired control of a tract of coal land known as the Fayette and Collins property, located on the Youghiogheny river just below Connellsville. The tract embraces 300 acres of surface, a number of houses, etc. It is said to be one of the finest tracts of coal land for coking purposes in the district. The price paid for it was $175,000. It is proposed to operate the place by the erection of a bridge across the Youghiogheny so that the coal can be delivered to the ovens, 500 of which will be built, the work on them to be begun immediately. They will be located about three miles west of Connellsville. The plant, when completed, will be about opposite the present Fort Hill coal works of Mr. Rainey.

Steel Wire Fly-Wheels.

MM. Mannesmann, of Remscheid, Westphalia, are manufacturing fly-wheels capable of double and even treble the speed of fly-wheels made of cast iron, the resistance of which is generally limited to a speed of 40 meters per second for the rim of the wheel. They have succeeded in obtaining fly-wheels which are capable of acquiring three times the speed of ordinary fly-wheels, by constructing the nave and the spokes of iron or steel, and making a rim entirely of steel wire wound round and round itself a great many times.

AMONG THE IRON MINES.

Menominee Range:—

W. H. Seldon, who is exploring on the Southern half of his homestead, has two shafts sunk on the side hill, one 55 feet and the other about 40 feet. The latter shaft will be carried down to the same level with the first one, when a drift will be made between the two shafts. Drifting will also be carried from the East and West of the shafts. A boiler and two pumps are already on the ground, and more machinery and tools are expected daily, when work will be pushed forward as rapidly as possible. Mr. Seldon informs us that there is a good out-cropping of ore on the ledge just South of where he has sunk his shafts.—[Crystal Fall Correspondence Reporter.

At the East Vulcan No. 3 shaft a body of ore has been cut at the 300-foot level, which promises to be a valuable one. The machinery at the new shaft is giving the best of satisfaction, and the breasts of the two drifts at the bottom of the shaft are now considerably more than 400 feet apart, the West drift entirely in ore. The body of ore on the North vein at the Southeast Vulcan, shows a width of eight feet, where it is now being stoped, and the width is increasing.—[Current.

The *Diamond Drill* estimates the Armenia output for the season at 95,000 tons, which it believes is within easy range from the present outlook. The new skip to be known as No. 2, from the shaft at the South, is about completed —all but laying the rails and a little trimming up, when nothing will prevent the management from hoisting close to 1,000 tons of ore every 24 hours.

It is reported that a new company, composed largely of Cleveland men, will shortly be organized to control the Armenia mine. The property is not controlled by the York Iron Co., as many suppose.

The *Current* says it is probable that a new shaft will be sunk at the Briar Hill, at a point about 500 feet West of the present exploring shaft.

The new shaft at the monitor was commenced last week and is progressing favorably. It will be a double working shaft 8x14 feet inside.

What is believed to be a valuable find of manganese was recently accidentally discovered in a field near the Mastodon mine. The stuff will be analyzed.—[Mining News.

The far-reaching ill-consequences of the disaster at Johnstown are exemplified by the fact that as one of these, an iron mine on the Menominee range, has been ordered to close down because of it, thus throwing about 250 men out of employment. The Cambria Iron Co., whose plant was destroyed by the flood which ruined Johnstown, operated the Norway mine, and orders have been received by the local management directing an immediate suspension of work. The company mined ore for its own use exclusively, and will have no need to resume work at the Norway mine until its furnace plant is rebuilt, so the village of Norway shares directly in the evil results of the disaster that brought death and desolation to the Pennsylvania town.—[Mining Journal.

We learn from an official source that the Hamilton Ore Co. will begin the sinking of a second shaft, immediately after the return of Supt. J. T. Jones, who is in the East, and who is to arrive in a few days. This is a step which has long been contemplated, and will give the company the means of prosecuting the work of stoping and hoisting the large body of ore passed through by the present shaft, and also add materially to the safety of the lives of the employes.—[Norway Current.

Gogebic Range:—

The development work at the Iron Belt mine at the present time consist of three main shafts and a timber shaft, and are known as Nos. 1, 2 and 3, respectively. No 1 is down to a depth of 250 feet, No. 2 to a depth of 200 feet and No. 3 200 feet. No. 1 is located about midway between Nos. 2 and 3, and the distance between Nos. 2 and 3 is about 750 feet. The ground for some distance east of No. 2 and west of No. 3 has been thoroughly explored and tested by drifts and cross-cuts on three levels,and all of these workings are in a splendid quality of ore. The average width of the ore body is found to be from sixty to seventy-five feet, and there is no indication of narrowing in the bottom level. It will be seen from the developments already made, which extend for a distance of 1,000 feet east and west along the deposit, that there is a very large amount of ore in sight on the different levels. It is the calculation to send out at least 100,000 tons of ore from the Iron Belt during 1889, and it is believed that no great trouble will be experienced in reaching this goodly amount.—[Iron Tribune.

Cross-cutting to the north and south is going on at the bottom of the 190-foot shaft at the Atlantic, and a good showing of ore was found last week to the north, which indicates that the ore body lies in that direction. Supt. Shafer, of the Iron Belt, has charge of the work—[Mining News.

The activity in exploration still continues on the range, north of Marenisco. Captain Adam Specht is making an encouraging showing on section 21, the property in which several Bessemer men are interested.—[Mining News.

Marquette Range:—

The deal between the owners of the Westside mine, Republic, and Frank Helig and other Oshkosh capitalists, for the purchase by the latter of a controlling interest in the property, has been practically consummated, and operations will shortly be resumed at that very promising exploration. Work at the mine was temporarily suspended a few weeks ago, on account of the presence of considerable water in the shaft and the difficulty of hoisting by means of a windlass. A pump, engine and hoist, the latter leased from the old Delphic company, are now upon the ground. As soon as the machinery is placed into position, the shaft, which has now attained a depth of 53 feet, will be sunk some 70 or 75 feet, when a cross-cut will be driven across the vein, 17 feet below the drift. The vein was found to be 13 feet in width, at a distance of 32 feet below the surface, but it is expected to materially widen at the greater depth indicated. The indications are that the Westside people have a large ore body near at hand, and now that there is an abundance of capital to speedily develop the property, shipments may be looked for from the Westside this season.—[Mining News.

Ore has just been struck in a drift north of No. 2 shaft at the Braastad mines. This shaft is located at a considerable distance south of the main workings, a diorite hill intervening. The shaft has been sunk to a depth of 120 feet, and it was from the bottom of this that the drift was run. Ore has also been cut in No. 4 shaft and shows a dip to the south, which is valuable for the property's future if it continues to hold its present course. The mine is producing about 550 tons per day, and is in excellent condition.—[Iron Ore.

At the iron ore prospect a mile west of Saginaw, the shaft started several days ago, has reached the ledge 16 feet from surface. Huge boulders rendered the task a slow one, but now that ore has been reached, sinking will proceed quite rapidly. The shaft is 8x12 feet inside of timbers.

Capt. Thos. Walters and Mr. Geo. R. Persons, of the Lake Angeline mine, this city, have options upon a large tract of land in St. Lawrence county, New York, and will soon place a diamond drill upon them to explore for iron ore and the more precious metals. One option covers a piece of land in which a farmer has for some time been trying to grow potatoes in hematite, and wondered why he did not get the usual good yield. Very little seems to be known by the residents of the minerals the lands contain. A fine vein of talc has been found and the property bought outright. A mill to treat it has been purchased, and work of grinding will be commenced at once. The value of the talc after going through the necessary process at the mill is $15 per ton, which figure ought to give a splendid margin of profit. The gentlemen interested are of the opinion that they have a promising tract to explore. Fine quartz is shown and gold is expected to be found.—[Iron Ore, Ishpeming, Mich.

Vermilion Range:—

Articles of incorporation of the Vermilion Range Iron Co. and the Mountain Range Iron Co. have just been filed with the register of deeds. Both are formed for the purpose of mining, smelting and refining ores, for buying or leasing lands, and for such other purposes as are usually incorporated in an iron company. Each has a capital stock of $50,000 and the limit of indebtedness in each is half that sum. Each has its chief place of business at Duluth, and the incorporators of each are the same persons, Messrs. Cassius C. Merritt, Leonidas Merritt and Alfred Merritt, all of Duluth; Kelsey D. Chase, of Faribault, and Clark Chambers, of Owatonna, all in Minnesota. All these incorporators are directors in each company.—[Duluth Herald.

The annual meetings of the Duluth & Iron Range Railway Co. and Minnesota Iron Co. were held at Duluth, June 11th. In the railroad company the only changes were the election of M. J. Carpenter, as vice president and director, in place of R. H. Lee, and D. H. Bacon, director in place of Samuel P. Ely. In the iron company the only change was the election of R. H. Lee, as director and member of the executive committee, in place of C. Tower, Jr. The surplus for the year, $1,300,000, was voted to be used at the discretion of the executive committee for the improvement of the property. It is learned, though not officially, that this means no less than the building by the company of a line of vessels to carry its ore to the eastern markets.

The onward march of the Minnesota mine is truly wonderful. The extensive improvements that are continually being made speak volumes for the business of this company. Near the lake shore an immense engine house is being built, where new and powerful air compressors will be placed. New shaft houses have been built, and in various quarters the diamond drill can be seen—altogether presenting a scene of encouraging activity. The operations in the mines have so increased during the past year that they now require the combined supervision of three mining captains, while Captain Wallace is occupied wholly with the work done on the surface. It is stated that within a few days three new shafts will be pouring forth their tons of hidden wealth. —[Iron Journal.

Lake Superior Shipments of Iron Ore:—

Shipments of iron ore from the mines of Lake Superior for the season of 1889, up to Wednesday, June 5th, are as shown by the appended statement, condensed from the Marquette *Mining Journal:*

MARQUETTE RANGE.

American	4,668	Hall	8,603	Prout	1,237
Barnum	918	Humboldt	2,578	Queen	8,303
Braastad	28,918	Jackson	20,437	Republic	80,041
Buffalo	6,480	Jackson, pit 7	2,968	Republic Reduction Co.	8,070
Buffalo, South	2,205	Lake Superior	6,693	Salisbury	3,733
Cambria	18,246	Lillie	9,918	Salisbury Bessemer	3,229
Champion	51,591	Lucy	1,412	South Buffalo	10,784
Cleveland	39,759	Marquette	10,369	Superior	15,480
Cleveland, Hematite	13,491	Michigamme	6,530	Superior, Hematite	20,236
Cliffs shaft	33,196	Milwaukee	9,573	Volunteer	6,750
Curry	2,798	Negaunee	16,938	Webster	117
Detroit	3,314	North Champion	1,118	Wetmore	1,373
East New York	2,087	Pitts. & L. Angeline	49,196	Winthrop	13,190
Total, Marquette Range					514,813

MENOMINEE RANGE.

Armenia	6,712	Great Western	7,737	Norway	18,672
Chapin	131,948	Hamilton	2,921	Paint River	2,247
Commonwealth	19,545	Iron River	31,077	Perkins	2,118
Crescent	6,050	Ludington	17,333	Vulcan	43,441
Cyclops	7,748	Mastodon	12,758	Walpole	1,835
Dunn	24,905	Millie	1,749		
Florence	38,129	Monitor	2,438		
Total, Menominee Range					373,293

GOGEBIC RANGE.

Anvil	7,188	Germania	18,951	Pence	22,623
Ashland	33,632	Iron Belt	11,743	Section 33 south	7,964
Aurora	30,796	Iron King	8,071	Sellwood Colby	3,481
Beaver	4,607	Norrie	114,713	South Colby	11,811
Brotherton	14,244	North Montreal	5,760	South 15 Colby	1,583
Cary	3,074	North Section 33	937	Windsor	4,272
Cary West	1,232	Pabst	19,919		
Total, Gogebic Range					326,516

VERMILION RANGE.

Minnesota Iron Co.	85,656	Chandler Mine	54,058
Total, Vermilion Range			139,714
Grand Total			1,354,336

STEAM POWER STORAGE.

A system of the steam power storage which marks a great advance in the economical and efficient use of steam as a motive power for street cars, etc. The system, so-called, consists of a fire-box around which is a series of pipes which receive hot water at a high pressure, say 360 degrees F., from stationary boilers, which may be placed at intervals along the route of the motor. The system can be charged in from 1½ to 2 minutes. Then a few incandescent coals from the fire-box of the stationary boiler are put into the fire-box of the system, and is ready for a trip of 25 to 30 miles without further attention.

The principle of the system is this: The steam from the cylinders of the motors is exhausted into chambers, one between the two cylinders and one on top of the system. These are connected by pipes leading from the bottom to the top. Steam is condensed in the two chambers, and the condensed water in the upper chamber returns by its own gravity through the condensing pipe to the chamber below, where it is taken by means of a pump or injector and forced inside a water jacket which surrounds the fire-box. Mingling with the heated water there it assumes the same temperature as that within the system, consequently, a continuous supply of hot water is available to run the motor for an indefinite period.

From this new and simple process are derived the following valuable features of the new motor: Absolute safety from explosion, great economy in running expenses, and such simplicity of construction and handling that it can be run by any man of ordinary common sense. Its safety is due not to the skill of the driver, but to the principle on which it is built. It is without smoke, cinders or vapor. The weight is so evenly distributed on four wheels that it can run on an ordinary street car track. It is at all times under the full control of the driver, and the car can be stopped in a space within its own length. Detention by blockades or other causes do not occasion any loss of power. The motor has sufficient power to easily pull one or more cars, and mount heavy grades. It can run backwards as easily as forwards. A speed of 15 miles per hour can be attained, and the rate of locomotion is entirely under the control of the driver. The Steam Power Storage Co. claims that street cars can be run by this process 40 per cent. cheaper than by horses. The exhaust steam can also be used to heat the cars.—[Boston Commercial Bulletin.

Personal.

After five months' absence in Europe, William F. Jarvis, of the firm of William F. Jarvis & Co., of Detroit, Mich., has returned home.

JUNE *Century* is an unusually rich and attractive number. Among the articles are the following: "Convict Mines of Kara," by Mr. George Kennan; "The Bloodhound;" "Early Heroes of Ireland," by Mr. McKay; "Certain Forms of Woman's Work for Woman," by Mrs. Helen Campbell; "An American Amateur Astronomer," an illustrated sketch of the career of Mr. Burnham, formerly of Chicago. In the Life of Lincoln several interesting chapters on important political events are published: "The Pomeroy Circular," "The Cleveland Convention," "The Resignation of Chase." "The Relations of the United States and Canada" is the subject of a paper by Charles H. Lugrin. Short stories are published by George A. Hibbard, entitled "The Woman in the Case," and by James Lane Allen, entitled "King Solomon of Kentucky," illustrated by Kemble. An interesting personal chapter is that by Mrs. Margaret J. Preston, the poet, who describes General Lee in his home "After the War." Mrs. Mary Hallock Foote's Far West picture is entitled "The Irrigating Ditch." In "Memoranda of the Civil War" are "The Canal at Island No. 10," "An Early Suggestion to Arm Negroes for the Confederacy," "Stonewall Jackson's Intentions at Harper's Ferry," and "A Question of Command at Franklin."

LIST OF PATENTS.

Relating to Iron, Steel, Metal, Machinery, Hardware and Mining Interests.

Reported expressly for this paper by H. T. Fisher, (late Ex. U. S. Patent Office), Patent Attorney, 34 Blackstone Building, Cleveland, O.

PATENTS BEARING DATE JUNE 4, 1889.

Blast furnaces, dust catcher for, F. H. Treat, Joliet, Ill.
Car for mines, tool, J. Treweek, Lead City, Dak. Ter.
Casting, core for, G. H. Bennett, Brooklyn, N. Y.
Casting steel ingots, E. L. Clark, Pittsburgh, Pa.
Ingot mould, E. L. Clark, Pittsburgh, Pa.
Iron direct from its ores, reducing, C. J. Eames, New York, N. Y.
Metal, apparatus for mixing molten pig, W. R. Jones, Braddock, Pa.
Metal, mixing molten pig, W. R. Jones, Braddock, Pa.
Sheet metal package, F. G. Caldwell, Wheeling, W. Va.
Steel direct from the ore, producing, W. F. M. McCarthy, Philadelphia, Pa.

A Great Reduction

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PRICE OF SHIPPING TAGS.

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The Cleveland Printing & Publishing Co.

CLEVELAND, OHIO.

"SPECIAL STAMPERS OF SHEET METALS."

We do **Stamping** and **Pressing** of Sheet Metals for all Classes of Work. Also **Tinning, Galvanizing** and **Japanning.**

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BOILER SCALE SOLVENTS.

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Two Books for Foundrymen.

AMERICAN FOUNDRY PRACTICE.

BY THOS. D. WEST.

Treating of Loam, Dry Sand and Green Sand Moulding, and containing a Practical Treatise upon the management of Cupolas and the Melting of Iron.

West's Moulder's Text-Book

Being Part II of American Foundry Practice.

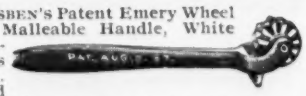
Presenting best methods and original rules for obtaining good, sound, clean csatings, and giving detailed description for making moulds requiring skill and experience.

Also containing a practical treatise upon the construction of cranes and cupolas, and the melting of iron and scrap steel in iron foundries. Either of the above books will be sent by mail, postage paid, $2.50; or, on receipt of $3.00, the IRON TRADE REVIEW will be sent one year, with either of the above books as a premium. Address

CLEVELAND PRINTING AND PUBLISHING CO.,

CLEVELAND, OHIO.

W. W. BRISBEN'S Patent Emery Wheel Dresser, Malleable Handle, White Hard Cutters, Brass Bearings. Warranted Price $3.00.



CLEVELAND, OHIO, U. S. A.

New England Newspapers.

For a check for **$135** we will insert a one-inch advertisement one month in our New England Select Local List, consisting of 26 Dailies and 123 Weeklies. Orders are sent to one-half the papers on the 1st of every month and the remainder on the 15th. Catalogue of papers sent on application. Proof of advertisement submitted before sending out, if desired. GEO. P. ROWELL & CO., Newspaper Advertising Bureau, 10 Spruce St., New York.

Middle States Newspapers.

For a check for **$180** we will insert a one-inch advertisement one month in our Middle States Select Local List, consisting of 65 Dailies and 173 Weeklies. Orders are sent to one-half the papers the first Week and the remainder the 3d Week in each month. Catalogue of papers sent on application. Proof of advertisement submitted before sending out, if desired. GEO. P. ROWELL & CO., Newspaper Advertising Bureau, 10 Spruce St., New York.

Southern Newspapers.

For a check for **$135** we will insert a one-inch advertisement one month in our Southern Select Local List, consisting of 40 Dailies and 87 Weeklies. Orders are sent to one-half the papers on the 13th of every month and the remainder on the 27th. Catalogue of papers sent on application. Proof of advertisement submitted before sending out, if desired. GEO. P. ROWELL & CO., Newspaper Advertising Bureau, 10 Spruce St., New York.

Western Newspapers.

For a check for **$275** we will insert a one-inch advertisement one month in our Western Select Local List, consisting of 112 Dailies and 241 Weeklies. Orders are sent to one-half the papers the 1st Week and the remainder the 3d week in each month. Catalogue of papers sent on application. Proof of advertisement submitted before sending out, if desired. GEO. P. ROWELL & CO., Newspaper Advertising Bureau, 10 Spruce St., New York.

Canada Newspapers.

For a check for **$50** we will insert a one-inch advertisement one month in our Canadian Select Local List, consisting of 15 Dailies and 47 Weeklies. Orders are sent to one-half the papers on the 11th of every month and the remainder on the 25th. Catalogue of papers sent on application. Proof of advertisement submitted before sending out, if desired. GEO. P. ROWELL & CO., Newspaper Advertising Bureau, 10 Spruce St., New York.

IRON AND STEEL MARKETS.

PIG IRON.

CLEVELAND (f. o. b. cars, four months): Bessemer, $17 00@17 50; No. 1 Foundry, $16 15@16 65; No. 2 Foundry, $15 15@15 65; No. 1 Gray Forge, red short, $14 15@14 65; No. 2 Gray Forge, neutral, $13 65@14 15; No. 1 American Scotch, $17 40@18 05; No. 2 American Scotch, $16 40@17 05.

CHICAGO (reported by Rogers, Brown & Co.): CHARCOAL IRONS—L. S. Nos. 1 and 2 Foundry, $18 00@19 00. Southern C. C. Foundry, $17 00@13 00; H. R. C. C. Foundry, $20 00@23 00. COKE AND BITUMINOUS—Ohio H.R. Strong Softeners No. 1, $18 25@00 00; Ohio H. R. Strong Softeners No. 2, $17 25@00 00; Ohio Hocking Valley Strong Softeners No. 1, $17 75@00 00; Ohio Hocking Valley Strong Softeners No. 2, $16 75 @00 00; Ohio Hocking Valley Silvery Softeners No. 1, $17 00@00 00; Ohio Hocking Valley Silvery Softeners No. 2, $16 00@00 00; Ohio Black Band Softeners No. 1, $18 00@18 50; Ohio Jackson Co. pure Softeners No. 1, $17 75@18 25; Ohio Jackson Co. pure Softeners No. 2, $16 75 @17 75; Norton & Ashland Brands, Ashland, Ky., pure Softeners No. 1, $17 00@17 50; do. No. 2, $16 00@16 50; Southern Coke Foundry No. 1, $16 00@00 00; Southern Coke Foundry No. 2, $15 25@00 00; Southern Coke Foundry No. 3, $14 75@00 00; Southern Coke Softeners No. 1, $15 25@00 00; Southern Coke Softeners No. 2, $14 25@00 00; Southern Coke Grey Forge $13 75@14 00; No. 1 Foundry (local furnaces at Chicago and in Northwest) $15 50@16 00; No. 2 Foundry $14 50@15 00; No. 3 Foundry $13 50 @14 00. CAR WHEEL AND MALLEABLE—Lake Superior Nos. 1 to 6, $18 50@19 50; Standard Southern Nos. 3 to 6, $19 00@19 50; Hanging Rock Cold Blast $23 50@26 00; Hanging Rock Warm Blast $21 00@23 00

CINCINNATI (reported by Rogers, Brown & Co.): HOT BLAST FOUNDRY—Ohio and Southern Coke No. 1, $14 75@15 25; Ohio and Southern Coke No. 2, $13 75@14 75; Ohio and Southern Coke No. 3, $13 00@13 50; Ohio Soft Stone Coal No. 1, $15 75@16 50; Ohio Soft Stone Coal No. 2, $14 75@15 50; Mahoning and Shenango Valley, $16 00@16 50; Hanging Rock Charcoal No. 1, $20 00@22 00; Hanging Rock Charcoal No. 2, $19 00@21 50; Tennessee and Alabamba Charcoal No. 1, $17 50@18 50; Tennessee and Alabama Charcoal No. 2, $16 50@17 50. FORGE—Strong Neutral Coke, $12 75@13 25; Mottled Neutral Coke, $12 00@12 50; Cold Short Coke, $12 50@00 00. CAR WHEEL AND MALLEABLE—Southern Car Wheel, $23 00@24 00; Hanging Rock Cold Blast, $22 00@25 00; Lake Superior Malleable and Car Wheel, $20 00@21 00.

LOUISVILLE (reported by Geo. H. Hull & Co.): Southern Coke No. 1 Foundry (new classification), $14 25@14 75; Southern Coke No. 2 Foundry (new classification), $13 75@14 25, Southern Coke No. 3 Foundry (new classification), $13 00@13 50; Grey Forge, $12 50@13 00; White and Mottled, different grades, $12 00@12 50; Silver Grey, different grades, $12 50@13 50; Southern Charcoal No. 1 Foundry, $16 00@16 50; Southern Charcoal No. 1 Mill, $14 50@15 00; Southern Car Wheel, Standard Brands, $21 75@22 75; Southern Car Wheel, other brands, $18 00@19 50; Hanging Rock Coke No. 1 Foundry, $15 50@16 00; Hanging Rock Charcoal No. 1 Foundry, $19 50@ 21 00; Hanging Rock Cold Blast, $20 75@22 75; Hanging Rock Warm Blast, $00 00@00 00.

ST. LOUIS (reported by Rogers, Meacham & Shields): HOT BLAST COKE AND CHARCOAL—Southern Coke No. 1, $15 25@16 00; Southern Coke No. 2, $14 75@15 25; Southern Coke No. 3, $14 25@14 75; Southern Grey Forge, $13 25@ 13 75; Southern Charcoal No. 1, $18 00@18 50; Southern Charcoal No. 2, $17 00@18 00; Missouri Charcoal No. 1, $16 00@16 50; Missouri Charcoal No. 2, $15 00@16 00; Ohio Softeners, $17 00@ 19 00. CAR WHEEL AND MALLEABLE IRONS—Lake Superior, $19 75@22 00; Southern, $19 00@ 23 00. CONNELLSVILLE COKE—East St. Louis, $4 40; St. Louis, $4 55.

DETROIT (reported by William F. Jarvis & Co.): Lake Superior Charcoal, all Numbers, $19 50@20 00; Lake Superior Coke, all Ore, $18 00@19 00; Lake Superior Coke, Cinder Mixed, $17 75@18 25; Standard Ohio Black Band, $18 00@19 00; Southern No. 1, $16 50@ 17 00; Southern Gray Forge, $15 00@15 50; Southern Silvery, $16 00@16 50; Jackson County (Ohio) Silvery, $18 00@18 75; Old Wheels, $18 50 @19 00.

PITTSBURGH (reported by A. H. Childs): No. 1 Foundry, $16 00@16 50; No. 2 Foundry, $15 00@15 50; No. 1 Mill, $14 25@14 50; White and Mottled, $13 00@13 50; Warm Blast Charcoal, $19 00@22 00; Cold Blast Charcoal, $22 00 @28 00; Bessemer, $16 25@16 50.

MERCHANT IRON AND STEEL.

Flat Bar.

1½ to 4 by ¾ to 1 inch.....1 70
4¼ to 6 by ⅜ to 1 inch.....1 80
1¾ to 6 by 1⅛ to 2 inch.....2 10
1¼ & 1⅜ by ⅜ to ¾ inch.....1 80
1 & 1⅛ by ⅜ to ¾ inch.....1 80
⅝, ¾ and ⅞ by ⅜ to ⅝ inch.....2 20

Round and Square.

1 to 1⅞ inch.....1 70
2 to 2⅝ inch.....1 90
2¾ to 3¼ inch.....2 20
3⅜ to 4 inch.....2 70
4⅛ to 4½ inch.....3 20
4¼ to 5 inch.....3 40

Oval.

⅜ to 1¼ inch.....2 10
⅜ to ¾ inch.....2 30
½.....2 50
⅝.....2 90

Half Oval and Half Round.

1½ to 3 inch.....2 80
⅜ to 1¼ inch.....2 40
⅜ to ¾ inch.....2 90
½.....3 20
⅝.....4 70

Heavy Band.

⅜ to 6 by ¼ and 5-16 inch.....1 95
1 to 1⅜ by ¼ and 5-16 inch.....2 05
⅜ to ⅞ by ¼ and 5-16 inch.....2 25
⅜ to ⅜ by ¼ and 5-16 inch.....2 75

Hoops.

1¼ to 4, Nos. 13 to 15.....2 55
1¼ to 2, Nos. 16 to 18.....2 65
1¼ to 2, No. 19.....2 75
1¼ to 2, No. 20.....2 85
1¼ to 2, No. 21.....2 95
1¼ to 2, No. 22.....3 05
15-16, 1 and 1⅛, Nos. 13 to 15.....2 75
15-16, 1 and 1⅛, Nos. 16 to 18.....2 85
15-16, 1 and 1⅛, Nos. 19 and 20.....2 95
15-16, 1 and 1⅛, No. 21.....3 05
15-16, 1 and 1⅛, No. 22.....3 25
⅞, Nos. 13 to 15.....2 95
⅞, Nos. 16 to 18.....2 05
⅞, Nos. 19 and 20.....2 15
⅞, No. 21.....3 25
⅞, No. 22.....3 35
13-16, Nos. 13 to 15.....3 15
13-16, Nos. 16 to 18.....3 25
13-16, Nos. 19 and 20.....3 35
13-16, No. 21.....3 45
13-16, No. 22.....3 55
¾, Nos. 13 to 15.....3 25
¾, Nos. 16 to 18.....3 35
¾, Nos. 19 and 20.....3 45
¾, No. 21.....3 55
¾, No. 22.....3 65
11-16, Nos. 13 to 15.....3 45
11-16, Nos. 16 to 18.....3 55
11-16, Nos. 19 and 20.....3 65
11-16, No. 21.....3 75
11-16, No. 22.....3 85
⅝, Nos. 13 to 15.....3 85
⅝, Nos. 16 to 18.....3 75
⅝, Nos. 19 and 20.....3 95
⅝, No. 21.....4 05
⅝, No. 22.....4 15
⅝, No. 23.....4 25

Light Band.

1½ to 6 by ⅛ to 3-16 in.....2 25
1½ to 6 by Nos. 11 and 12.....2 35
1 to 1⅜ by ⅛ to 3-16 in.....2 35
1 to 1⅜ by Nos. 11 and 12.....2 45
⅞ and 13-16 by ⅛ to 3-16 in.....2 65
⅞ and 13-16 by Nos. 11 and 12.....2 75
¾ and 11-16 by ⅛ to 3-16 in.....2 95
¾ and 11-16 by Nos. 11 and 12.....3 05
⅝ and 9-16 by ⅛ to 3-16 in.....3 25
⅝ and 9-16 by Nos. 11 and 12.....3 30
½ by ⅜ to 3-16 in.....3 50
½ by Nos. 11 and 12.....3 60

Wagon Box Iron.

⅞ inch, beveled edge, by Nos. 11 and 12.....2 75
⅞ inch, " " " 13 and 14.....3 05
¾ inch, " " " 11 and 12.....3 05
¾ inch, " " " 13 and 14.....3 25

Sheet Iron.

No. 10 to 14.....2 50
No. 15 to 17.....2 70
No. 18 to 21.....2 80
No. 22 to 24.....2 90
No. 25 to 26.....3 00
No. 27.....3 10
No. 28.....3 30

Iron Boiler Plates.

Tank, ¼ inch and heavier.....2 35
C No. 1, " " 2 60
C H No. 1 " " 2 85
C H Flange, " " 3 55
Extra Flange, " 3 95
Solid Fire Box, " 4 85

Steel Boiler Plates—1-4 in. and Heavier.

Tank.....2 55
Shell.....2 95
Flange.....3 20
Marine Flange.....3 70
Fire Box.....4 35

Above includes plates 90 inches wide.
90 to 96 in. wide.....½c ℔ extra
96 to 100 in. wide.....1 c "
100 to 104 in. wide.....1½c "
104 to 116 in. wide.....special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. ℔s
1 to 2 in. inclusive	09
9-16 to ½ in "	09
7-16 to ⅜ and 2⅜ to 3 in	10½
3⅛ to 4 in	11
⅜ to 11-16 and 4⅛	10½
⅛ to 6 in	11½
¼ to 9-32 and 6⅛ to 7 in	12
3-6 in	14

Flats.

	cts. ℔s
2 to 9-16 wide by 2 to 5⅛ thick	6

Bessemer and O. H. Steel.

	ct. ℔
Machinery	base price, 02¾
Tire	" 02¾
Spring	" 03¼
Sleigh Shoe	" 02¾
Toe Calk	" 03
Cutter Shoes, tapered and burr.	" 03

English Tool Steel.

Jessop's.....16c
Hobson's "Best".....16c
" "Choice".....36c

Burden Boiler Rivets.

½, 5⅛, 11-16 and ¾ inches diameter.....4 00
Bridge ½, 5⅛, 11-16 and ¾ inch diam.....4 00

SCRAP IRON AND OLD METAL.

	Net Ton.
No. 1 R. R. wrought scrap	$17 50
No. 1 wrought scrap	15 00
No. 1 Machine cast scrap	12 00
Stove Plate (free from burnt iron)	10 00
Grate Bars	8 50
Pipes and flues (Clean)	13 00
Tank iron	12 50
Hoop and band iron	10 00
Iron axles	24 00
Light sheet iron	10 00
Axle turnings	14 00
Wrought turning (free from cast)	12 50
Wrought iron, oily drillings	11 00
Cast borings	9 00
Malleable iron	10 00
Uncut wrought iron boilers	10 00
Steel boiler plates	14 50
Old iron T rails	gross tons 22 00
Old steel rails	18 50
Car wheels	20 00
Old copper	℔ 10
No. 1 H. red Brass	11
Heavy yellow brass	8½
Light yellow brass	6
Scrap Zinc	
Tea Lead	
Heavy Lead	3¼

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MINERS AND SHIPPERS OF
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Mines on the Cleveland, Lorain & Wheeling R. R. Capacity, 3,000 tons daily.
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Blooms and Billets, Steel Angles, Forgings, Bar and Spring Steel, Steel Street Rails, Steel Oil Barrel Hoops, Wire of all Kinds, Iron and Steel Boiler Plates, Galvanized and Black Sheet Iron, Corrugated Iron Roofing, Sheet Steel.

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IRON ORE - -
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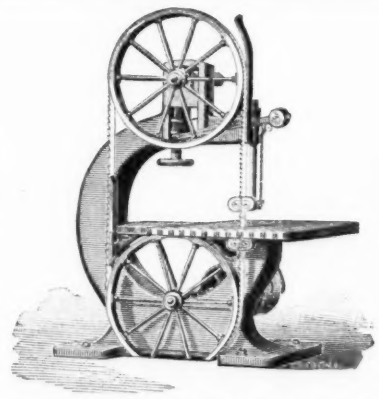
EXCLUSIVELY PIG IRON,
Strong Foundry and American Scotch Irons, Gray Forge and Bessemer Irons for steel purposes.
Room 57, Grand Arcade, Cleveland, O.



$80 will buy the best band saw in the world.
$100 will buy our new patent 40-inch band saw.
$185 will buy our new patent band re-sawing machine.
$125 will buy the best automatic rip-sawing machine. Weatherboarding attachment included, and one 12-inch rip saw. For further particulars address
STANDARD MFG. CO.,
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AUTOMATIC
VERTICAL ENGINES.
Especially designed for
Small Electric Light Plants.
Perfect Regulation. 5 to 20 Horse-Power.
Send for Specifications and Prices.
LLOYD & STERRETT,
ERIE, PA., U. S. A.
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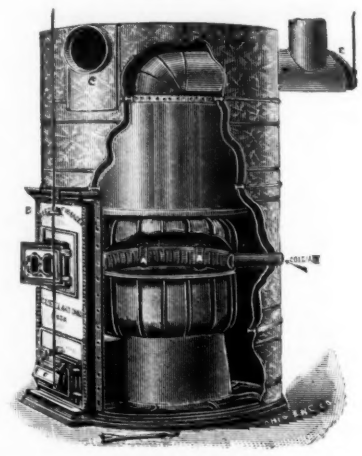
Burns Hard Coal, Soft Coal, Coke or Natural Gas.



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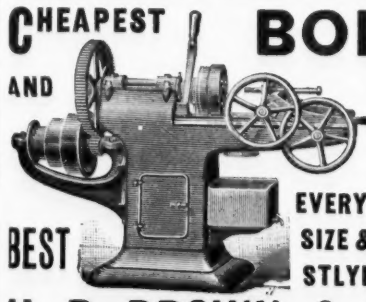
223 and 225 River St., CLEVELAND, O.
ENGINEERS AND CONTRACTORS.
Worthington Steam Pumps, Electric Light Engines and Automatic and Slide Valve Engines of all Descriptions.
Steam Plants, Complete, Furnished and Set Up.

JOHN A. McCONNELL & CO., PITTSBURGH, PA.
PIPE Coverings,

Hot Blast Abestos Cement, Mineral Wool and Hair-Felt Coverings of every description. The above cut shows REED'S CELEBRATED SECTIONAL COVERING.

LABORATORY
—OF—
CHEMISTRY - AND - PHYSICS.
Tests of Ores and Strengths of Material requiring expert work a specialty. Address,
J. F. ELSOM,
New Albany, Indiana.

CHEAPEST AND BEST BOLT CUTTERS.



EVERY SIZE & STLYE.
H. B. BROWN & CO.,
EAST HAMPTON, CT.
We allow One Dollar to every purchaser sending us this advertisement.

MACHINERY SUPPLY MARKET.

Anvils.

American.....₩ lb 9@10
Wrights.....₩ lb 9½

Bellows.

Blacksmiths' { Hill's.....dis 40 / Bullock's....dis 50&10
Moulders'.....dis 40@40&10
Hand.....dis 40&10@50

Belting.

Boston Belting Co's standard.....dis 70@70& 5
" " " extra.....dis 60&5@60&10
" " " best.....dis 55
Hoyt's Short Lap.....dis 45
Cleveland Rubber Co. extra standard.dis 60&10
Shultz Raw Hide Leather Belting, single.....dis 30
Shultz Raw Hide Leather Belting, double.....dis 35
Standard, oak tanned.....dis 55@60
Alexander Brothers' pure oak tanned....dis 45

Blowers and Exhausters.

B. F. Sturtevant's.....dis 20
Boston Blower Co.,.....dis 35
Buffalo.....dis 35

Borax.

.....₩ lb 9½@10½

Chalk.

White.....₩ gross 50
White Crayon.....₩ gross 12@12½ dis 10
Red.....dis 70
Blue.....dis 85

Chucks.

Cushman's 4 Jaw Independent.....dis 40
" Combination.....dis 40
" Geared Scroll.....dis 30
" 2 Jaw Brass Workers.....dis 25
" Drill.....dis 35
Wescott's Scroll Combination.....dis 30
" Independent.....dis 40
" Little Grant Drill.....dis 30
Horton's Universal & Ind.....dis 40
National Combination.....dis 40
Sweetland " .....dis 40
Skinner " .....dis 40
" Independent.....dis 40
Almond Drill.....dis 25
Morse " .....dis 15
Skinner " .....dis 30

Cutters and Reamers.

Cleveland.....dis 10@15
Pratt & Whitney.....dis 10@15
Standard.....dis 10@15
Brown & Sharpe, Milling Cutters.....dis 15
" " Gear Cutters.....dis 15

Crowbars.

Cast Steel.....₩ lb 4
Iron, steel points.....₩ lb 3½

Drill and Drill Stocks.

Twist drills.....dis 50&10
Morse Taper and Straight shank to 1½".....dis 50&10
Morse Taper and Straight shank Larger than 1½".....dis 25
Drill Sockets.....dis 20
Standard.....dis 50&10
Cleveland.....dis 50&10
Maneer's bench.....dis 50&25
Maneer's post.....dis 50&10

Emery.

	No. 4 to 46 gr.	No. 54 to 150. gr.	Flour, F.	C. F. FF.
Kegs, ₩ lb	4 c	5 c		2½c
½ kegs ₩ lb	4¼c	5¼c		2¾c
¼ kegs ₩ lb	4½c	5½c		3 c
10 lb cans, 10 in case	6 c	6½c		5 c
10 lb cans, less than 10	10 c	10 c		7½c

Emery Cloth and Paper.

Barder, Adamson & Co.....dis 40@46
H. H. Barton.....dis 40@46

Emery Wheels.

Detroit.....dis 50@60
Norton's.....dis 55@60
Grant.....dis 55@60
Union Stone.....dis 60
Sterling.....dis 60
Vulcanite.....dis 15@20
Celluloid.....dis 10
Northampton.....dis 55
Crystal.....dis 65@70
Vitrified.....dis 60

Files.

Nicholson.....dis 60&10@60&10&10
" X. F.....dis 25
Kearney & Foot.....dis 60&10@60&10&10
Black Diamond.....dis 60&10@60&10&10
Arcade.....dis 65@70
Disston's.....dis 65@70
Western.....dis 70
Stub's.....dis 25
Grobet's.....dis 30
Reynolds Bros.' Hand Cut.....dis 50

Hammers.

P. S. W.....dis 40
Atha new list, Jan. 15, 1887.....dis 50
Heavy hammers and sledges under 5 lbs. 18c over 5 lbs 14c, new list.

Jack Screws.

Illinois Bolt Co. list.....dis 70

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4¼	4	3¼	3½
Hexagon	15½	11½	8½	6	5¾	5¼	5
Washers	9	8	7	5	4½	4½	4½

In lots less than 100 lbs, ₩ lb add ½c., 1 lb boxes add 1c to list.

Nails (wire.)

List July 14, 1887.....dis 70 &10
Standard Penny Nails, ₩ keg card rate
{ Car lots.....$2.50
{ Less than car lots $2.60

Oilers.

Zinc and Tin.....dis 60
Brass and Copper.....dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₩ doz.....dis 10@10&10

Packing, Steam.

Boston Belting Co.....dis 60
American Packing Hemp.....₩ lb 10@11
Russia Packing " .....₩ lb 14
Italian Packing " .....₩ lb 13@14
Plumbago Piston.....₩ lb 40
Morrison's " .....₩ lb 50
Square Flax " .....₩ lb 70
Sheet Rubber.....₩ lb 12@24
Excelsior Rubber.....₩ lb 48

Picks.

Railroads, 5 to 6 lbs.....$12 dis 60&5@60&10
" 6 to 7 lbs.....$13 dis 60&5@60&10

Pulleys.

Iron Pulleys, Walker List.....dis 45
Medart Pulleys.....dis 55
Split Wood Pulleys.....dis 45

Rivets.

Iron, Thousand, list November 17,.....dis 50@50&10
Iron, Ordinary, Cooper's Block and Carriage list November 17.....dis 50
Copper.....dis 50@50&10

Rope.

Manilla, ½ inch and over.....₩ lb 15¼
Sisal, ½ inch and over.....₩ lb 13¾

Sand Paper.

B. A. & Co.....dis 40@40&10
H. H. Barton's.....dis 40@40&10
New England Flint.....dis 40@40&10
Barton's Garnet.....dis 20

Saws.

Disston's Circular.....dis 45
" Band.....dis 20
" Scroll.....Net
Hack Saw Stubs.....dis 20
" " Eureka.....dis 20
" " Star.....dis 20
Saw Swages Disston's.....dis 20
Atkins' Cicular Saws.....dis 50
" Mill, Mulay and Drag Saws..dis 40&10
" Wood Saws.....dis 40&10
" Silver Steel Diamond Cross-cut Saws.....dis 70c per ft
" Dexter Cross-cuts.....dis 50c "
" Diamond " .....dis 30c "
" Tuttle Tooth Cross-cuts..dis 25c "
" One-man Cross-cuts.....dis 32c "
No. 1 Handles.....dis 23c per pair
No. 6 " .....dis 16c "
Excelsior Saw Tools.....$6 per doz
Perfection " .....$15 "

Screws.

Wood Screws—List Jan 27, 1889.

Flat head iron.....dis 50
Round head iron.....dis 40
Flat head brass.....dis 45
Round head brass.....dis 35
Square Cap.....dis 65
Hexagon Cap.....dis 60
Set C. H. C. P.....dis 70
Machine, flat head, iron.....dis 55
Machine, round head, iron.....dis 50
Bench and hand—
Lag or coach.....dis 75@75&10
Coach, patent gimlet point.....dis 75

Shovels and Spades.

Ames' list November 1, 1885.....dis 20
Dennis.....dis 5.25
Hussey & Binns, railroad.....dis 8.00

Taps.

Cards, Hand and Nut to 2 in.....dis 50
Carpenters' " " " .....dis 50
Morse " " " .....dis 50
Pratt & Whitney " " .....dis 25
Machine Screw Taps.....dis 55
Pipe Taps to 2½ in.....dis 70
Stay Bolt Taps.....dis 25
Stove Bolt Taps.....dis 50
Pulley Taps.....dis 40

Twine.

	BC.	B.
No. 12, Flax Twine, ¼ and ½ lb Balls		21c@29c
No. 18 " " ¼ and ½ "		18c@28c
No. 36 " " ¼ and ½ "		16c@27c
2-Ply Hemp, ¼ & ½ lb Balls (Spring Twine)		11½c
3-Ply " 1 lb Balls		12@12¼c
3-Ply " 1½ lb Balls		11@11¼c
Cotton Wrapping, 5 Balls to lb		15@16c

Vises.

Solid Box.....dis 60
Parker's.....dis 20@25
Prentiss.....dis 20
Stephen's.....dis 25@30
Barrett's.....dis 30
Miller's Falls.....dis 40
Merrill's.....dis 10@15
Howard.....dis 30
Maneer's machinist.....dis 50&10

Wire.

New List, Jan. 18, 1884

Brass and copper.....dis 20@25
Bright and annealed, Nos. 0@18...dis 70&10@75
" " Nos. 19@26..dis 75@75& 5
" " Nos. 27@36..dis 75&10& 5
Coppered Nos. 0 to 18, market list..dis 70@70& 5
Galvanized Nos. 0 to 18 " ".....dis 65&5
Tinned market Nos. 0 to 18.....dis 67½
Cast steel.....dis 50
Tinned Broom Wire.....dis 70&5@70&10
Annealed Fence, Nos. 8 and 9.....dis 75
Annealed Grape, Nos. 10 to 14.....dis 75
Stub's Steel Wire regular.....$6.00@lb dis 30

Wrenches.

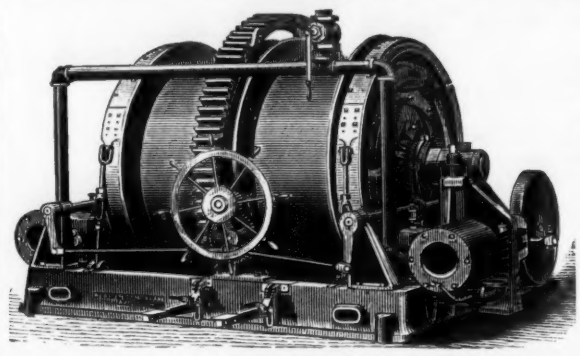
Coe's genuine, cash in ten days.....dis 50
Girard Standard.....dis 70&10
Agricultural.....dis 75&10
Mechanics'.....dis 55&10,& 3
Bemis & Call's Combination.....dis 35
Donohue's Engineers.....dis 20&10
Lamson & Sessions Engineers.....dis 60
Billings & Spencer's Drop Forged.....dis 10
William's " " .....dis 10
Alligator " " .....dis 40

Sebastian, May & Co.'s

Improved Screw-Cutting FOOT or POWER LATHES.

Catalogue of Lathes, Drill Presses & Machinists' Tools and Supplies mailed on application. Lathes on Trial. 164 W. Second St., CINCINNATI, O.

Webster, Camp & Lane Machine Co.



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Mining Machinery,

Improved Band Friction Hoisting Machinery, Geared or Direct Acting, for round or flat rope.

Wire Rope Haulage Machinery,

(Endless or Tail Rope Systems.)

CORNISH PLUNGER AND BUCKET LIFT PUMPS.

Automatic or Slide Valve Steam Engines, Sheaves, Cages, Buckets, Etc.

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Lubricator for Traction, Portable and all other small Engines, pumps, etc. Single connection.

IMPROVED UNIQUE AUTOMATIC

Steam Sight Feed Lubricator

Endorsed by leading **Engine Builders.** The only Sight Feed Lubricator that will feed beeswax successfully. An advantage which users and builders of Ice Machines will appreciate. Manufactured under strong patents, the validity of which is acknowledged.

Active Agents wanted. Special inducements to dealers.

Our Lubricators will be sent to responsible parties, subject to trial under **positive guarantee** to give satisfaction.

Unique Lubricator Co., Mansfield, O.

Lubricator for Stationary Engines. Double Connection.

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IRON PLANERS.

26x26 and 28x28, 30x30, with bed from 6 to 14 ft. long. Address all correspondence to

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N. E. Cor. 8th and Lock, CINCINNATI, O.

CLEVELAND FOUNDRY.

Castings

For Machinery and Rolling Mills.

CAR WHEELS

All sizes and kinds, with and without Axles.

Chilled Faced R. R. Frogs

ST. RAILROAD TURNOUTS.

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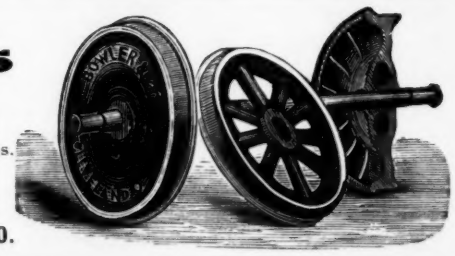

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SYKES' IMPROVED Best Roof in the World. Suitable for all classes of Buildings. Easy Put On.

All my Iron is Re-Rolled and Box Annealed, well Painted on both sides with Best of Paint and Pure Linseed Oil.

ONE QUALITY

Send for Circular and Price List, and mention this Paper.

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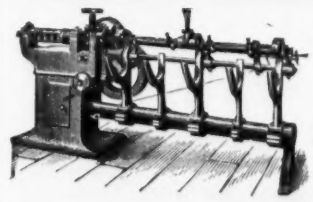
MANUFACTURERS

STEAM BOILERS.

Blast Furnaces, Tanks, Stacks, Stills, Agitators, Car Tanks, Etc.,

REEVES BROS., Props.,

Correspondence solicited. NILES, Trumbull County, O.



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MACHINERY FOR STRAIGHTENING AND CUTTING WIRE

To Accurate Lengths Direct from the Coil.

Also Machinery for Hardware and other Manufacturing.

CAMBRIDGE ROOFING CO., Cambridge, O.,

Manufacturers of

Plain, Rolled, Crimped Edge, Corrugated and Beaded Roofing, Siding and Ceiling.

PURE STEEL A SPECIALTY.

Send for Descriptive Catalogue.

HARDWARE MARKET.

Augers and Bits.

ommon augers and bits.....dis 70
nell's.....dis 60&5
Cook's Douglass Mfg. Co.....dis 55
Russell Jennings' augers and bits.....dis 25
Expansive Bits, Clark's small, $18; large, $26.....dis 35@35&5
Hollow Augers, Ives'.....dis 25&10
Hollow Augers, Bonney's Adjust. ₩ doz., $48.....dis 40&10
Hollow Augers, Stearns' Adjust. ₩ doz., $48.....dis 20&10
Gimlet bits, common.....per gross $2 75@3 25
Standard Bit Stock Drills.....dis 50&10&5
Ship Augers.....dis 15&10@15&10&5

Axes.

Makers' and Special Brands—
First quality.....₩dox. $6 00@6 50
Others.....₩doz. $5 50@5 75
Full polished.....$8 00

Bolts.

Cast iron barrel bolts.....dis 70@70&10
Cast iron shutter bolts, etc.....dis 70@70&10
Cast iron chain bolts.....dis 65&10
Ives' patent door bolt.....dis 60
Wrought iron barrel bolts.....dis 70@70&10
Wrought iron square bolts.....dis 70@70&10
Wrought shutter bolts.....dis 60&10
Sargent's list
Carriage, common, new list.....dis 75&10
Tire, common, new list.....dis 70
Carriage and tire, Philadelphia pattern.....dis 75&10
Stove bolts.....dis 62½
Plow bolts.....dis 60&5
Machine.....dis 75&10@80
Ends.....dis 75&10&80

Buckets, Elevator.

.....dis 50&10

Butts.

Wrought brass.....dis 70@70&10
Cast brass, loose joint.....dis 33⅓&10
Cast Iron—
Fast joint, narrow.....dis 50&10&5@60&5
Fast joint, broad.....dis 55&10&5@60&10
Loose joint.....dis 70&10@75
Loose joint, jap.....dis 70&10@75
Loose joint, jap. with acorns.....dis 70&10@75
Loose pin, acorns.....dis 70&10@75
Loose pin, japanned acorns.....dis 70&10@75
Loose pin, acorns, jap. plated tips..dis 70&10@75
Wrought steel—
Wrought, fast joint, narrow.....dis 70&10@75
Wrought, fast joint, broad.....dis 70&10@75
Wrought, loose joint, broad.....dis 70&10@75
Table Butts, back flaps, etc.....dis 70&10@75
Regular inside blind.....dis 70&10@75
Light inside blind.....dis 70&10@75
Loose pin.....dis 70&10@75
Light loose pin.....dis 70&10@75

Chains.

Trace, 6½-10-2.....₩ pair 1.03
Trace, 6½-10-3.....₩ pair .92 } 50&10@50&10&5
Trace, 7-10-2.....₩ pair 1.11
German Halter Chain, list June, 1887...dis 50&10
German Coil, list of June, 1887..dis 50&10&5@60
Galvanized Pump Chain.....₩ lb5½@46
Jack Chain, Iron.....dis 75@75&5
Jack Chain, Brass.....dis 70@70&5

Chisels.

Socket Framing and Firmer.....dis 75&5@75&10
Socket Framing and Firmer, Buck Bros..dis 30
Socket Firmer and Framing, L. & I. J. White.....dis 30@30&5
Tanged Firmers.....dis 40&10

Cutlery.

Table.....net
Excelsior Pocket.....net

Gimlets.

Nail and Spike.....dis 50&10&5
Double cut, low list.....dis 25
"Bee".....₩ gross $12, dis 25@25&5

Hangers.

Barn door, old patterns.....dis 10&10@70
Climax, (Anti-Friction).....dis 70
Star.....dis 40&10@40&10&5
Scranton.....dis 40
Kidder's.....dis 50&10@60
Terry's Patent.....5 in., $12; 4 in., $10, dis 50&5
Paragon.....dis 40&10
Richard's.....dis 30@30&10

Horse Nails.

	No. 10	9	8	7	6	
Ausable, ₩ lb.	23	24	25	26	28.	dis 25&10@25&10&10
Putnam, ₩ lb.	18	19	20	21	23	dis 15
Essex						dis 25&10@25&10&10

Horse Shoes.

Burden, at factory.....₩ keg $4 00
R. I. Horshoe Co., Perkins' Imp. at factory.....₩ keg $4 00
Mule Shoes, at factory.....₩ keg $5 00

Knobs.

Carriage, japanned.....₩ gross 80c dis 60&10
Base, rubber tip.....dis 70&10&5
Hemacite door knobs, new list.....dis 40&10@50
Door mineral.....dis 65c@68c
Door Por. japanned.....dis 75c@78c
Door Por. nickle.....$2 00@2 25
Door Por. plated.....$2 00@2 25

Locks, Bolts, Etc.

P. & F. Corbear, Locks and Bronze Goods.
Door locks, knobs and latches.....dis 60
Escutcheons and keys.....dis 60
Padlocks and padlock keys.....dis 66⅔
Bell pulls, mineral, porcelain and jet.....dis 60
Bell pulls, genuine bronze.....dis 60&10
Lever bell pulls, genuine bronze.....dis 60&10
Butts', genuine bronze.....dis 60&10
Butts' bronze plated.....dis 60&10
Store door locks and latches.....dis 60&10
Store door handles.....dis 60&10
Shutter hinges&flaps,genuine bronze.dis 60&10
Shutter hinges, bronze plated.....dis 70
Flush bolts, genuine bronze.....dis 70
Shutter knobs, genuine bronze.....dis 50
Shutter bars, genuine bronze.....dis 60
Sash lifts, genuine bronze.....dis 60
Sash pulls and plates, genuine bronze.....dis 60
Push plates, genuine bronze.....dis 60
Drawer pull, genuine bronze.....dis 66⅔
Letter box plates, genuine bronze...dis 60&10
Barn door locks.....dis 33⅓

Plumbs and Levels.

Standard list.....dis 70&10@70&10&10
Pocket levels.....dis 70&10@70&10&10
Davis' inclinometers.....dis 10&10

Pumps.

Cistern, best makers.....dis 50&10@60
Pitcher spout, best makers.dis 60&10@60&10&10
Pitcher spout, cheaper goods dis 70&5@70&10&5

Pokes, Animal.

Bishop's I. X. L.....₩ doz $6 50
Bishop's O K.....₩ doz $6 50
Bishop's Pioneer.....₩ doz $3 75
Bishop's American.....₩ doz $3 00

Rakes.

Cast steel.....dis 65
Malleable.....dis 70@70&5

Razors.

J. R. Torrey Razor Co.....dis 20
Wostenholme & Butcher.....$10@[illegible]...dis 10
Rifle razor.....dis $9 50 net

Scales.

Hatch, Counter, No. 171.....₩ doz $21 00
Hatch, Tea, No. 161.....₩ dox $6 75@7 00
Chatillon's Grocers.....dis 50
Family Turnbulls.....dis 30@30&10
Scale Beams, List of January 12, 1882.....dis 50&10@50&10&4

Screw Drivers.

Stanley R. & L. Co.'s Varnished Handles.....dis 65&10
Stanley R. & L. Co.'s Black Handles..dis 60&10
Sets interchangeables.....₩ doz $18 dis 25

Squares.

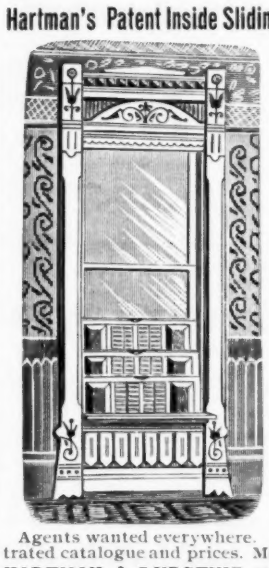
Steel and iron.....
Nickel plated.....} dis 75&10@80
Disston's try square and T bevels.....dis 45&10
Winterbottom's try and miter.....dis 30&10

Tacks, Brads, Etc.

New List, January 2, 1888.

American iron carpet tacks all kinds.....dis 80@80&5
Steel carpet tacks all kinds.....dis 80@80&5
Swedes iron carpet tacks, all kinds.....dis 80@80&5
Swedes iron tacks.....dis 75&5@75&10
Swedes iron Upholsterers' tacks.....dis 75&10@75&10&5
Tinned Swedes iron tacks..dis 75&10@75&10&5
Tinned Swedes iron Upholsterers' tacks.....dis 75&10@75&10&5
American iron cut tacks.....dis 75@75&10
Copper tacks.....dis 50&10
Copper finishing and trunk nails.....dis 50&10
Cigar box nails.....dis 50&10@50&10&5
Finishing nails.....dis 70&10@70&10&10
Hungarian nails and miners' tacks.....dis 70&10@70&10&10
Gimp and lace tacks.....dis 75&10@75&10&5
" " " tinned.dis 75&10@75&10&5
Trunk and clout nails.....dis 70&10@70&10&10
Tinned trunk&clout nails.dis 70&10@70&10&10
Basket nails.....dis 70&10@70&10&10
Chair nails.....dis 70&10@70&10&10
Common and patent brads.dis 70&10@70&10&10
Tinned capped trunk n'ls..dis 70&10@70&10&10

Hartman's Patent Inside Sliding Window Blind



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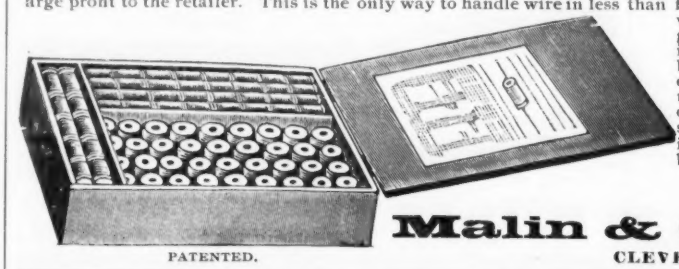
In Painted Wooden Box with Hinged Cover.

This assortment contains over 140 Spools of Black and Tinned Annealed Steel, Copper and Brass Wire, and Comprises almost every size likely to be called for. It has been put up by us especially to meet the demands of the Retail Hardware Trade, and it covers all of the most salable sizes without any dead stock. It will readily bring over $10.00 at retail and represents a large profit to the retailer. This is the only way to handle wire in less than full bundles, as it will not rust, tangle or tarnish, and is convenient for both dealer and consumer. Write us for a net price on the whole assortment, or order it from your jobber.



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146, 148 AND 150 WATER STREET,
CLEVELAND, OHIO.

HARDWARE, IRON, NAILS AND METALS

OF EVERY DESCRIPTION.

Railway, Machinists' and Miners' Supplies.

WILLIAM JESSOP & SONS AND PETER STUBS' CELEBRATED CAST STEEL.

MALLEABLE AND CAST GAS AND WATER FITTINGS.

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Is a Simple, Compact and Durable Device, Superior to all Other Methods for

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It is cheap, easily applied, and gives perfect satisfaction. Adapted to old and new windows, and does not require box frames. Does not get out of order and is a PERMANENT FIXTURE.

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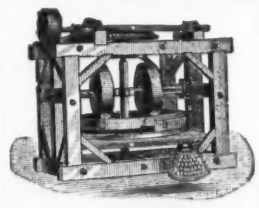

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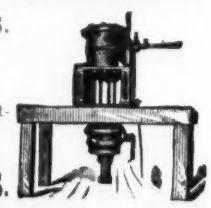

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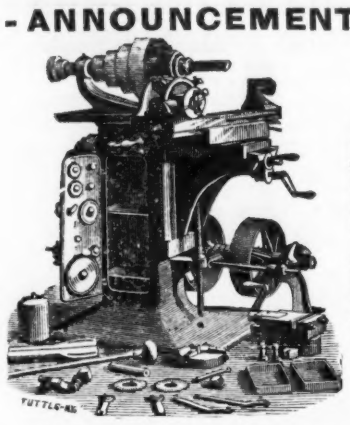

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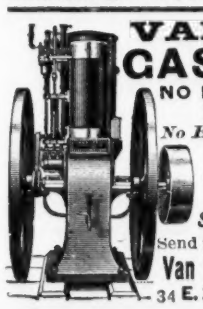

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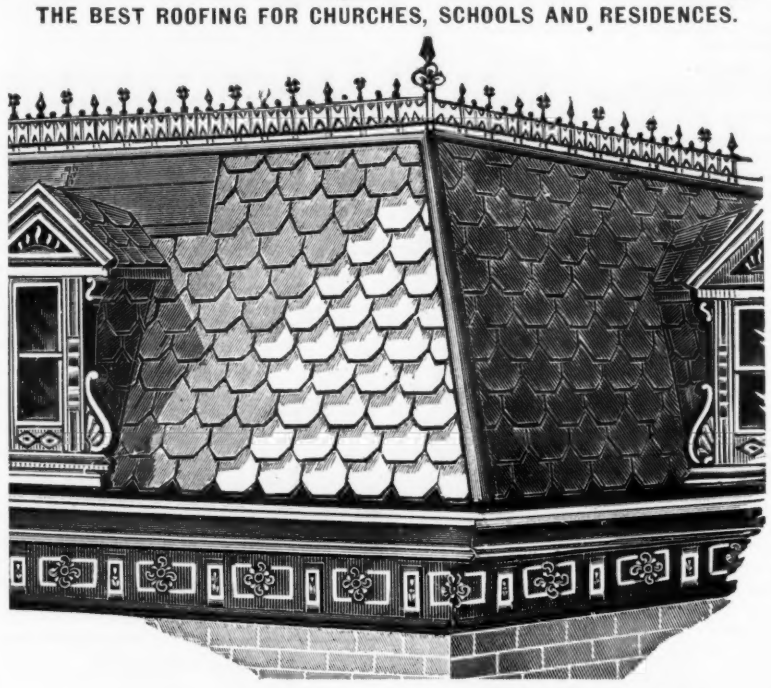

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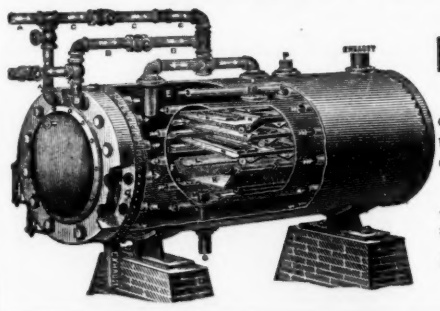

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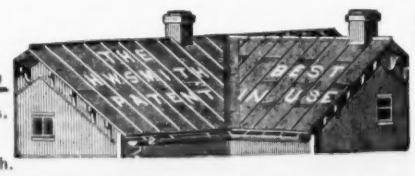

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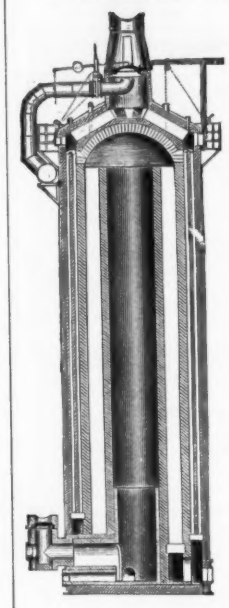

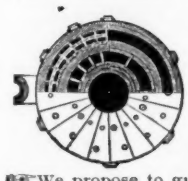

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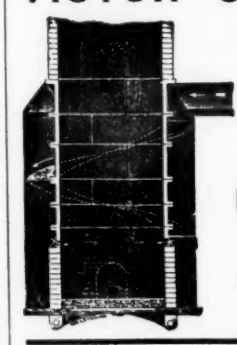

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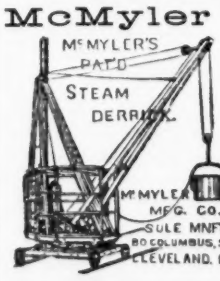

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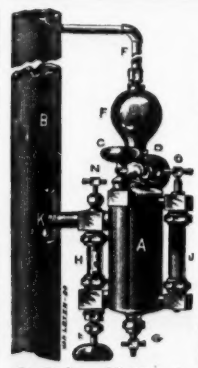

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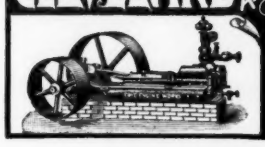

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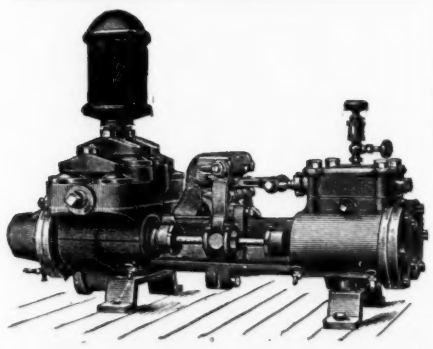

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FAST TIME. NO DELAYS.

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Through valleys green, 'mong mountains ser-
The people's favorite route I ween, [ried,
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Pittsburgh, Pa.

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	ARRIVE.	DEPART.
Detroit Steamer	†5 00 a. m.	9 00 p. m.

For Mackinac and Lake Huron ports take Thursday's steamer. City ticket office 224 Bank street. †Daily except Sunday.

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Direct route, Columbus, O., to Circleville, Chillicothe, Waverly, Portsmouth, Ironton and Ashland, Ky. Three trains daily except Sunday. Favorite route, North and West, making close connection at Ashland, Ky., with the Chesapeake & Ohio Ry., through the canons of New River, passing White Sulphur Springs and the many Summer resorts of the Alleghenies in Virginia.

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Standard Time.
Revised March 6th, 1888.

N. Y., C. & St. L. R. R. Co.—"The Nickel Plate."

Eastward.	Arrive.	Depart.
Buffalo Passenger	10 40 a m	10 45 a m
Chicago Passenger	9 20 p m	.....
Local Freight	4 30 p m	.....
Westward.	**Arrive.**	**Depart.**
Chicago Passenger	.....	6.30 a m
Fostoria Passenger	5 06 p m	5 11 p m
Local Freight	1 00 p m	.....

Rocky River Accommodation departs 7:40 a. m.; 1:40 p. m.

Euclid Accommodation departs 6:20 a. m.; 4.55 p. m.

All trains daily, except Sunday.

Cleveland & Pittsburgh.

	Arrive.	Depart.
New York Express	12 50 p m	7 45 a m
New York Express	6 35 p m	1 05 p m
Alliance & Akron Accom	9 35 a m	3 25 p m
Ravenna Accommodation	8 25 a m	5 00 p m
Night Express	*5 25 a m	*11 10 p m

*Daily; all other trains daily, except Sunday.

Mt. Vernon & Pan Handle Route.

C., A. & C. Ry. Co.	Arrive.	Depart.
Akron, Col. & Cin. "Flyer"	5 40 p m	8 10 a m
Akron, Col. & Cin. Night Express	7 00 a m	8 00 a m
Akron, Col. & Zanesv'e Ex	12 50 p m	1 95 p m
Akron & Orrville Accom	9 35 a m	3 25 p m

The 8 p. m. train runs daily. Elegant Pullman palace sleeping cars attached. All other trains daily, except Sunday.

Erie Railway.

Depot, South Water Street and Viaduct.

	Arrive.	Depart.
N. Y. & Pitts. Express	‡5 38 a m	*8 25 a m
Fast N. Y. & Pitts. Express	*10 55 a m	*3 00 p m
Mahoning Accommo	.....	†6 40 a m
Pittsburgh Express	†6 25 p m	.....
Youngstown Local	†8 05 a m	.....
Mahon'g div. & Pitts Local	.....	*11 40 a m
Mahoning Val. Accom	.....	†4 30 p m
Pittsburgh Express	†1 20 p m	11 10 p m
New York Express	*8 00 p m	.....

*Daily. †Daily, except Sunday. ‡Daily except Monday.

Cleveland & Canton Railroad.

Depart—
Canton and Coshocton—7:30 a. m., 4:05 p. m.
Bedford—7:30 a. m., *9:00 a. m., 11:10 a. m., 2:00 p. m., 4:05 p. m., 5:45 p. m., *8:15 p. m.
Newburgh—6:10 a. m., 7:30 a. m., *9:00 a. m., 11:10 a. m., 2.00 p. m., 4:05 p. m., 5:45 p. m., *8:15 p. m.
Kent—7:30 a. m., *9:00 a. m., 4:05 p. m., *8:15 p. m.

Arrive from—
Canton and Coshocton—9:50 a. m., 6:25 p. m.
Bedford—6:00 a. m., *7:40 a. m., 9:50 a. m., 1:05 p. m., 4:15 p. m., 6:25 p. m., *7:15 p. m.
Newburgh—6:00 a. m., 7:10 a. m., *7:40 a. m., 9:50 a. m., 1.05 p. m., 4:15 p. m., 5:35 p. m., 6:25 p. m., *7:15 p. m.
Kent—*7:40 a. m., 9:50 a. m., 6:25 p. m., *7:15 p. m.

Theatre train leaves Cleveland every Saturday night for Newburgh and Bedford 10:35 p. m.

Trains marked with * run daily. All others daily, except Sunday.

Depot at Ontario St., opposite Huron St.

Valley Railway.

FOR AKRON, CANTON AND MARIETTA

Depot foot South Water Street.

	Depart.	Arrive.
Valley Junction Mail	*7 45 a m	*6 30 p m
Marietta Express	†11 15 a m	†2 30 p m
Valley Junction Express	*4 15 p m	*10 15 a m
Cleve. and Canton Express	*7 00 p m	†8 15 a m

*Daily. †Daily, except Sunday.

WM. THORNBURGH, Gen. Manager. R. A. CARRAN, Gen. Pass. Agt.

Cleveland, Lorain and Wheeling.

All trains arrive and leave the Union Depot as follows:

	Depart.	Arrive.
Wheeling Express	6 45 a m	6 55 p m
Uhrichsville Express	4 00 p m	9 20 a m

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The shortest and quickest Route to Pittsburgh, Washington and Baltimore & the Southeast.

New Central Depot So. Water St. and Viaduct.

	Depart.
No. 62, Accommodation	† 6 05 a m
No. 72, New York Express	* 8 10 a m
No. 72, Fast Pittsburgh Express	* 8 10 a m
No. 64, Fast Pittsburgh Express	* 3 00 p m
No. 66, Mantua Accommo	* 4 20 p m
No. 68, New York Vestibule Limited	* 7 30 p m
No. 70, Pittsburgh Local Express	*11 50 a m
No. 74, Jamest'n, Pitts. & Y'ngst'n Ex	† 4 20 p m
	Arrive.
No. 65, Fast New York Express	*10 05 p m
No. 61, Pittsburgh Express	* 7 15 a m
No. 71, Mahoning Express	* 2 10 a m
No. 67, Pittsburgh Express	†12 30 p m
No. 63, New York Express	* 6 50 p m
No. 63, Pittsburgh Express	* 6 50 p m
No. 69, Pittsburgh Local Express	† 8 50 p m
No. 73, Mantua Accommo	* 7 20 p m

*Daily. †Daily, except Sunday.

Baggage checked through to all points East.

Through tickets and information regarding the route can be obtained at office, 141 Superior street, and at Depot N. Y., P. & O. Railroad, South Water street and Viaduct, Cleveland.

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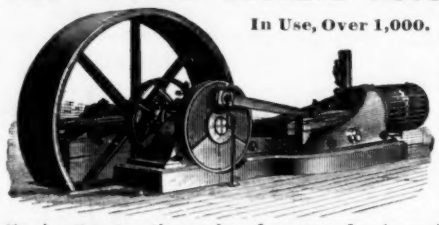

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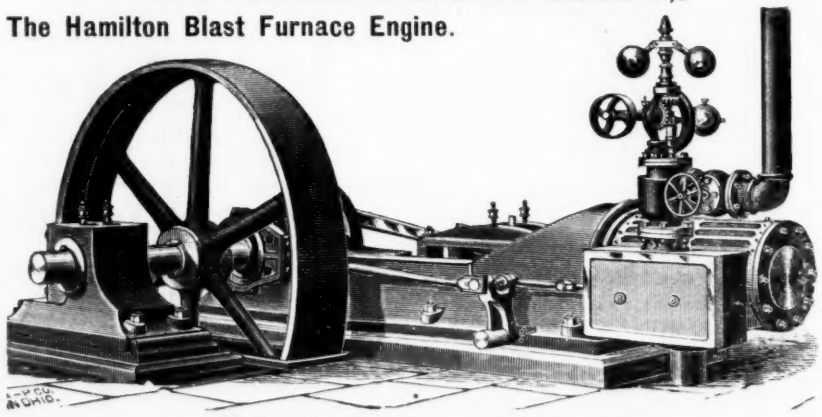

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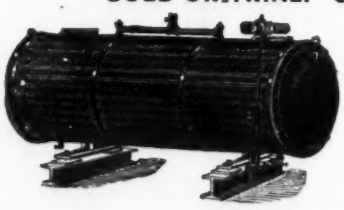

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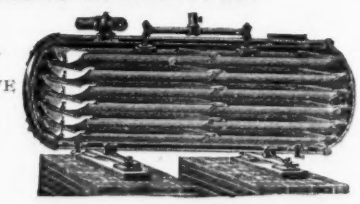

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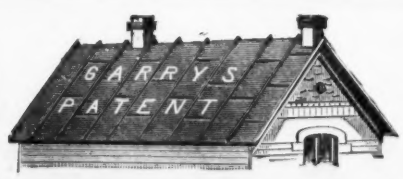

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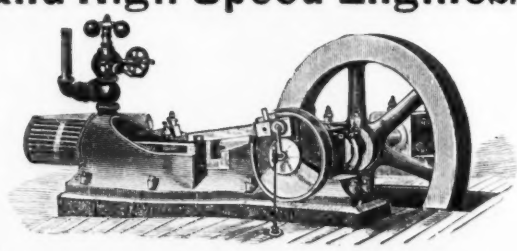

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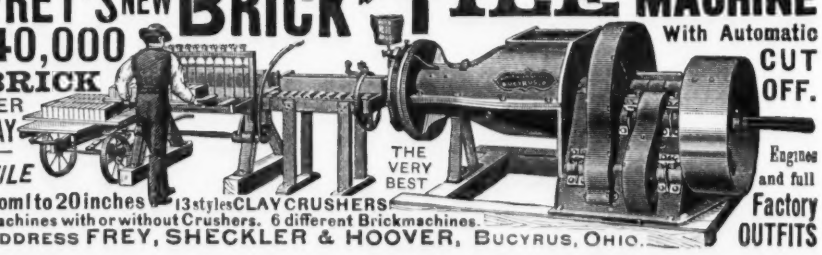

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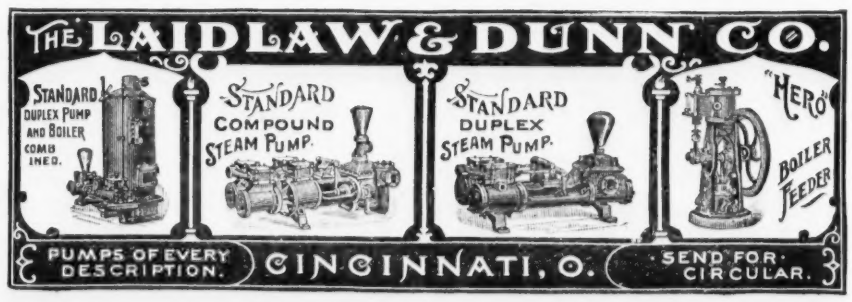

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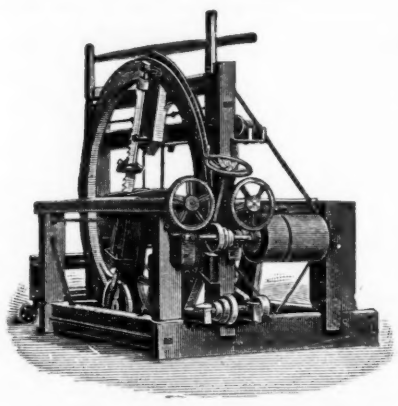

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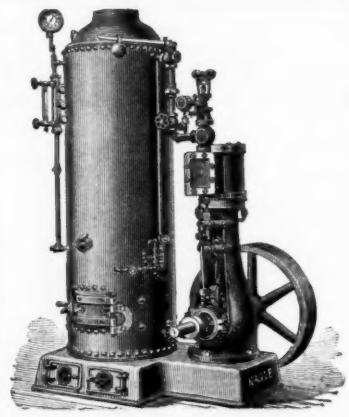

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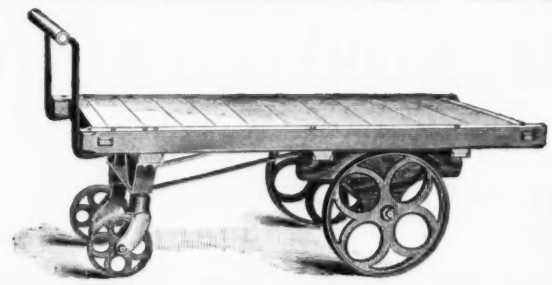

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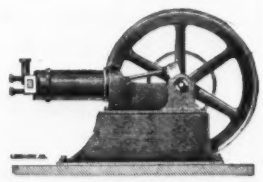

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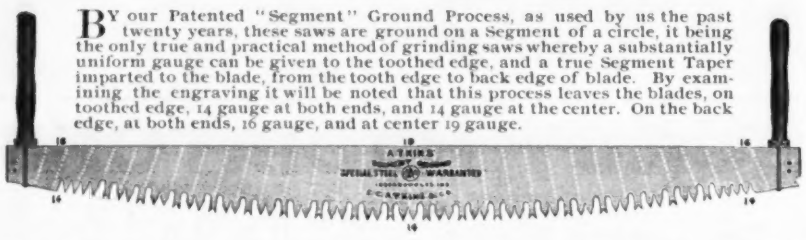

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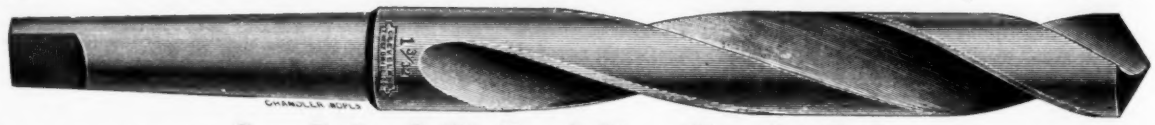

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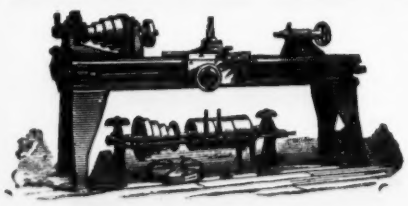

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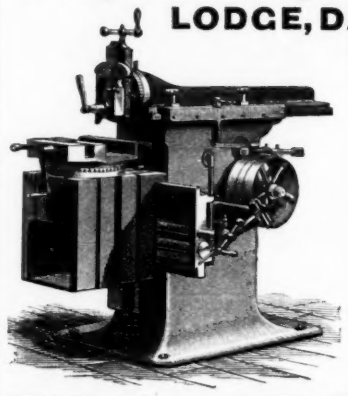

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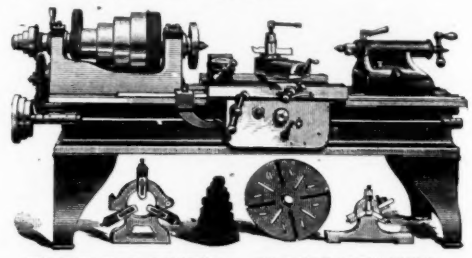

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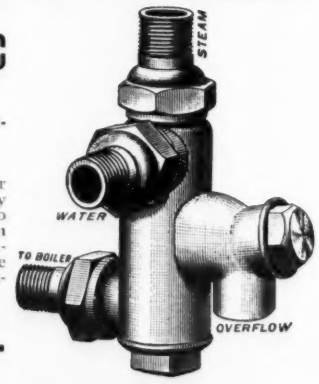

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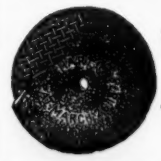

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